October 1992 Issue #15

Radio Fun

[redacted]

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"The beginner's guide to the exciting world of amateur radio."

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DARA Communications Van to the Rescue

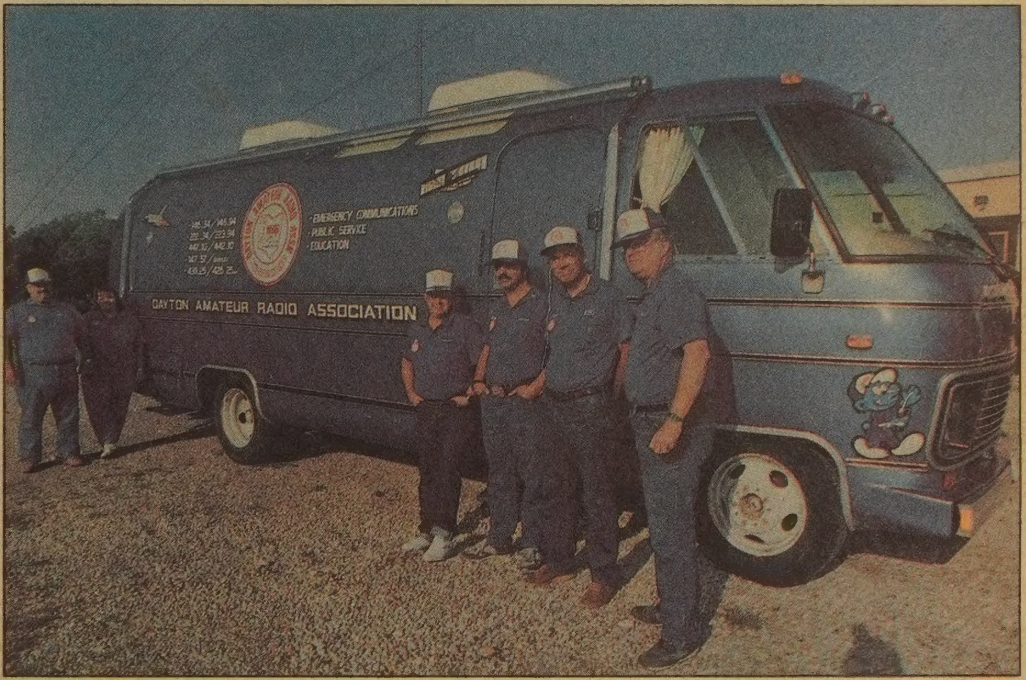
Police and fire officials in Brookville, Ohio, planning for a visit by President Bush, found they needed a command post to coordinate coverage of the event. Aware of the Dayton Amateur Radio Association Communications Van, they asked if it could be made available. DARA agreed and furnished the van and also operators to assist with the technical details.

The van had previously been authorized to have equipment capable of operating on the Dayton fire and police frequencies so it already had some capabilities. Other frequencies used by the departments were close enough to the ham bands so that the fixed antennas on the van worked fine.

Everything went off without a hitch, and while no ham activity was involved, the versatility of the van did not go unnoticed. Police and fire officials from all over the area were on hand to see how the operation was handled in the event they would be involved in a similar visit.

Most were impressed by the fact that the unit could be moved anywhere with its own electrical power. The air conditioned interior also drew favorable comment.

Most important, however, was the recognition that in the event there was a breakdown in their systems, a well-trained, well-equipped amateur radio organization could be activated as backup in a few minutes.

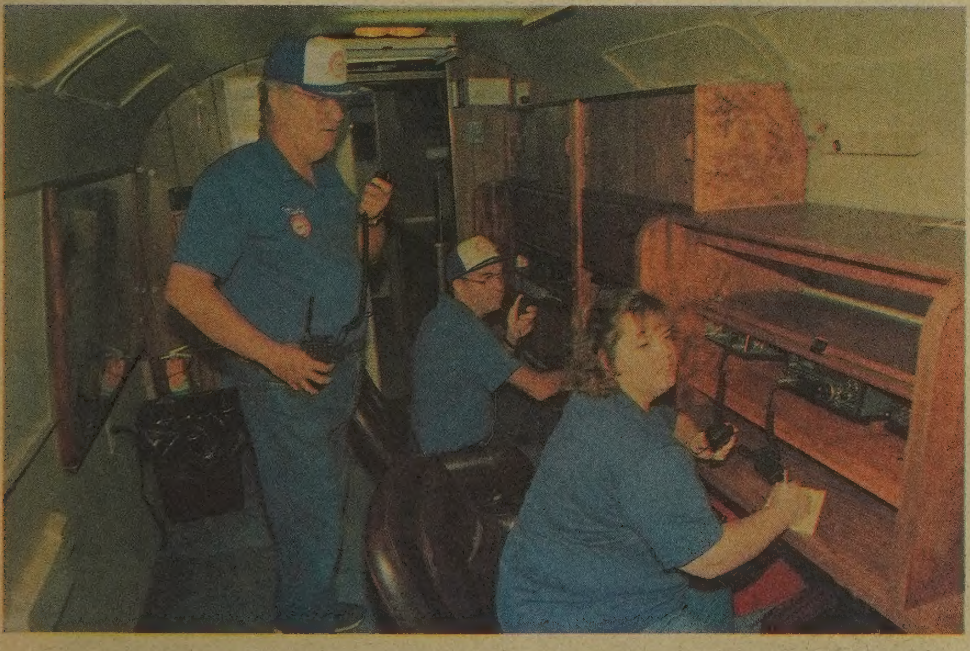


The Dayton Amateur Radio Association Communications Van (l to r): John Edwards KB8DJD, Lesley Brewer KB8IDM, Jim Orihood WD8JCI, Gregg Brewer KB4TLH, Ernie Hudson KI8O and Marty Schmeltz N8OVX. Photo by Dave Pelaez AH2AR/8.

U.S. Secret Service officials covering the event commented that they wished similar facilities were available at other stops on the cross-country junket.

DARA operators were Ernie Hudson KI8O, Area Emergency Coordinator, and Lesley Brewer KB8IDM, Van Coordinator. Ron Moorefield W8ILC, District Emergency Coordinator, handled the initial planning.

TNX Robert R. McKay N8ADA for the story.



The operating positions inside of the DARA Communications Van. This converted 33-foot long motorhome carries 2 HF rigs, VHF and UHF rigs, 1 Red Cross radio, ATV and Packet. The van can be powered from its 10 kw generator, batteries, or commercial power. (l to r): Marty Schmeltz N8OVX, Ernie Hudson KI8O (county EC) and Lesley Brewer KB8IDM (Van Coordinator). Photo by Dave Pelaez AH2AR/8.

Founder of Hallicrafters Dies

William J. Halligan W9AC, founder and retired chairman of the Hallicrafters Company, died July 14 at age 93 in Miami Beach. The man who started the firm in 1933 as a supplier of amateur radio shortwave receivers, and then developed it into a major manufacturer of electronic equipment for the home, industry, the military and aerospace, resided in Bal Harbour, Florida, and formerly in Chicago, Illinois.

Halligan, a native of Boston, Massachusetts, received a radio experimenter's license while still in high school, and held the amateur radio call letters W9AC. He worked as a wireless operator on excursion ships between Boston and other coastal cities, serving in WWI as a radio operator on the battleship *Illinois*.

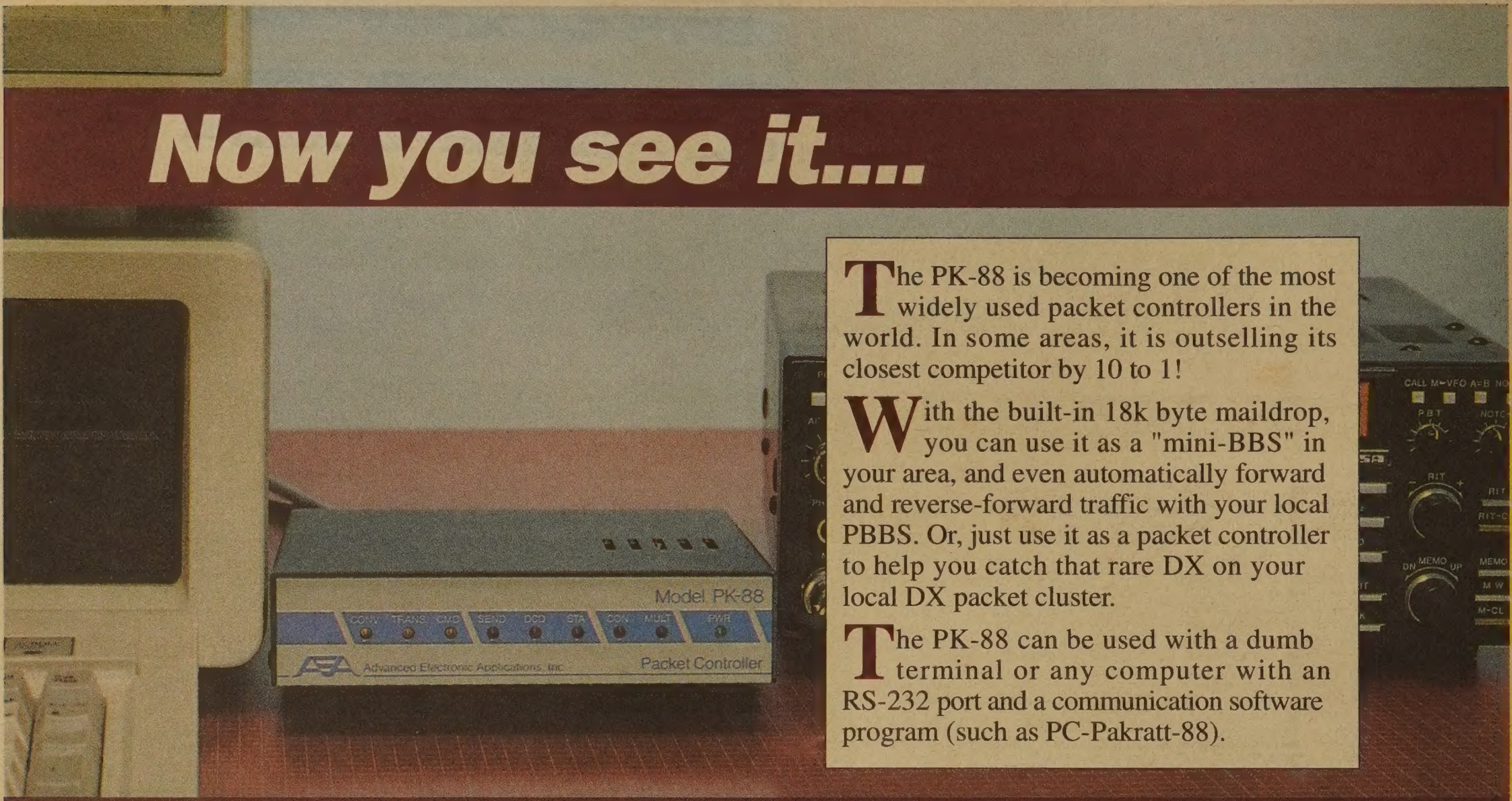
Halligan attended West Point, but quit the military academy to instead become a newspaper reporter in Boston, and then later in New York. He left journalism to become the sales manager for a radio supply company in Boston, then started Hallicrafters in 1933.

During WWII, Hallicrafters made shortwave radios for the military. After the war ended, the company took to production of home television receivers and peacetime radar. In the early 1960s, the company's military contracts constituted 70% of its revenues. Hallicrafters helped to develop the Air Force Quick Reaction Capability (QRC) program, and then moved into space communications.

A 1953 *Chicago Tribune* article said of Mr. Halligan that due to his prominence in the industry, he was sometimes referred to as "Wireless Willie," or "Radio's #1 Ham."

Halligan, who served as President and CEO of Hallicrafters, continued in that position even after the company was acquired by Northrop in the 1960s. He retired in 1967, and is survived by two sons, William Jr. and Jack, 10 grandchildren and 12 great-grandchildren. *TNX Chicago Tribune; W9JUV; Westlink Report #631, August 14, 1992.*

Now you see it....

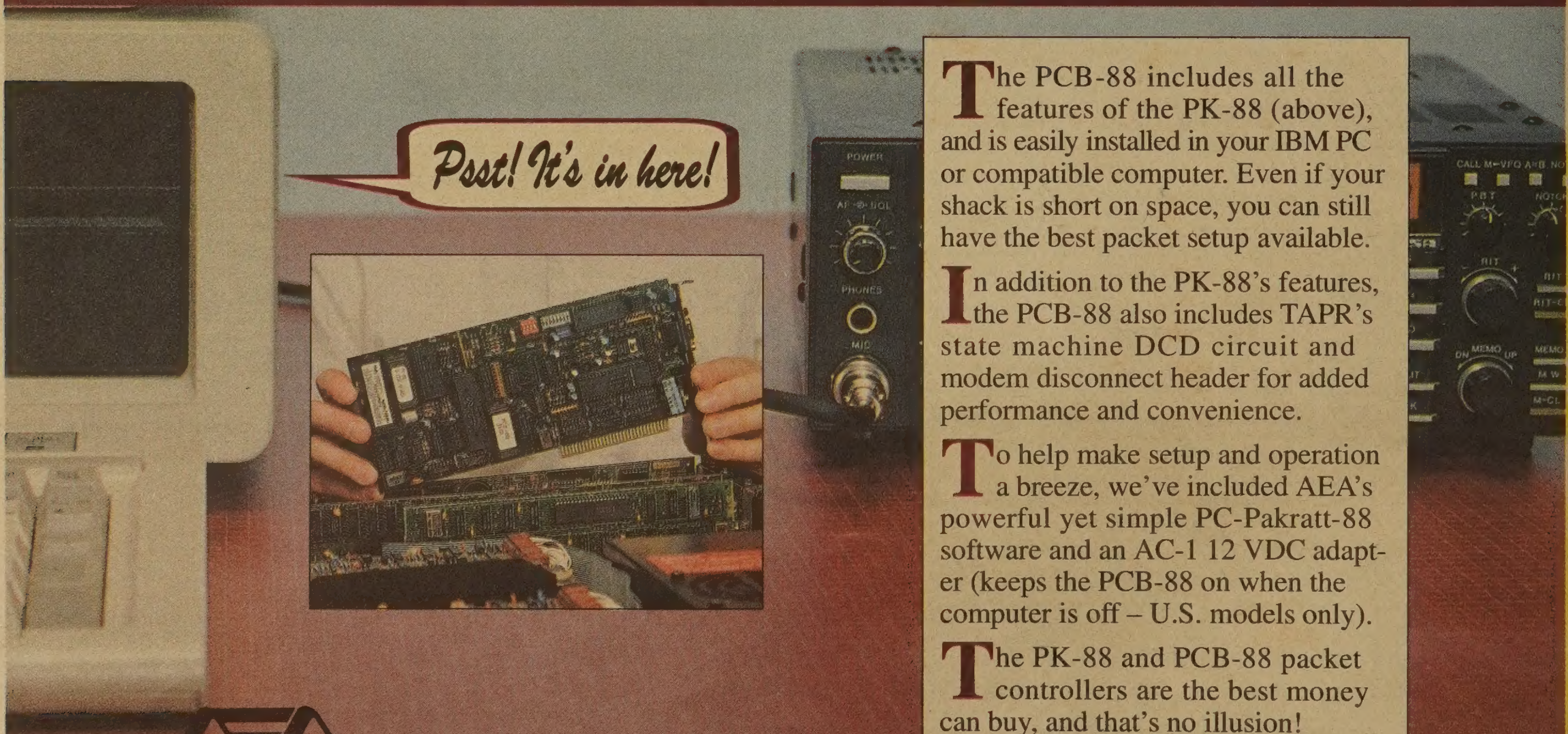


The PK-88 is becoming one of the most widely used packet controllers in the world. In some areas, it is outselling its closest competitor by 10 to 1!

With the built-in 18k byte maildrop, you can use it as a "mini-BBS" in your area, and even automatically forward and reverse-forward traffic with your local PBBS. Or, just use it as a packet controller to help you catch that rare DX on your local DX packet cluster.

The PK-88 can be used with a dumb terminal or any computer with an RS-232 port and a communication software program (such as PC-Pakratt-88).

Now you don't.



The PCB-88 includes all the features of the PK-88 (above), and is easily installed in your IBM PC or compatible computer. Even if your shack is short on space, you can still have the best packet setup available.

In addition to the PK-88's features, the PCB-88 also includes TAPR's state machine DCD circuit and modem disconnect header for added performance and convenience.

To help make setup and operation a breeze, we've included AEA's powerful yet simple PC-Pakratt-88 software and an AC-1 12 VDC adapter (keeps the PCB-88 on when the computer is off – U.S. models only).

The PK-88 and PCB-88 packet controllers are the best money can buy, and that's no illusion!

Advanced Electronic Applications, Inc.
P.O. Box C2160 / Lynnwood, WA 98036
Customer Service (206)775-7373 • Upgrade Hot line (206)774-1722
Catalog Request line (800)432-8873 • CompuServe User ID 76702,1013

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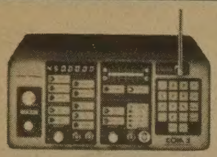
RAMSEY ELECTRONICS



COM-3 $279500

2 WAY RADIO SERVICE MONITOR

COM-3, the world's most popular low-cost service monitor. For shops big or small, the COM-3 delivers advanced capabilities for a fantatic price—and our new lease program allows you to own a COM-3 for less than $3.00 a day. Features •Direct entry keyboard with programmable memory •Audio & transmitter frequency counter •LED bar graph frequency/error deviation display •0.1–10.000 µV output levels •High receive sensitivity, less than 5 µV •100 kHz to 999.9995 MHz •Continuous frequency coverage •Transmit protection, up to 100 watts •CTS tone encoder, 1 kHz and external modulation.

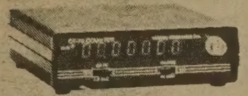
RSG-10 $249500

SYNTHESIZED SIGNAL GENERATOR

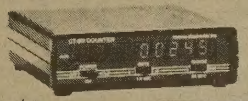
Finally, a low-cost lab quality signal generator—a true alternative to the $7,000 generators. The RSG-10 is a hard working, but easy to use generator ideal for the lab as well as for production test. Lease it for less than $3.00 a day. Features •100 kHz to 999 MHz •100 Hz resolution to 500 MHz, 200 Hz above • – 130 to + 10 dBm output range •0.1 dB output resolution •AM and FM modulation •20 programmable memories •Output selection in volts, dB, dBm with instant conversion between units •RF output reverse power protected •LED display of all parameters—no analog guesswork!

FREQUENCY COUNTERS

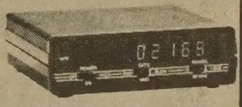
CT-70 7 DIGIT 525 MHz



CT-90 9 DIGIT 600 MHz



CT-125 9 DIGIT 1.2 GHz



Ramsey Electronics has been manufacturing electronic test gear for over 10 years and is recognized for its lab quality products at breakthrough prices. All of our counters carry a full one-year warranty on parts and labor. We take great pride in being the largest manufacturer of low-cost counters in the entire U.S.A. Compare specifications. Our counters are full-featured, from audio to UHF, with FET high impedance input, proper wave shaping circuitry, and durable high quality epoxy glass plated-thru PC board construction. All units are 100% manufactured in the U.S.A. All counters feature 1.0 ppm accuracy.

NEW CT-250 2.5 GHZ

ACCESSORIES FOR COUNTERS

Telescopic ship antenna—BNC plug, WA-10	$11.95
High impedance probe, light loading, HP-1	$16.95
Low-pass probe, audio use, LP-1	$16.95
Direct probe, general purpose use, DC-1	$16.95
Tilt bail, elevates counter for easy viewing, TB-70	$ 9.95
Rechargeable internal battery pack, BP-4	$ 8.95
CT-90 oven timebase, 0.1 ppm accuracy, OV-1	59.95

ALL COUNTERS ARE FULLY WIRED & TESTED

MODEL	FREQ. RANGE	SENSITIVITY	DIGITS	RESOLUTION	PRICE
CT-50	20 Hz–600 MHz	< 25 mV to 500 MHz	8	1 Hz, 10 Hz	$189.95
CT-70	20 Hz–550 MHz	< 50 mV to 150 MHz	7	1 Hz, 10 Hz, 100 Hz	$139.95
CT-90	10 Hz–600 MHz	< 10 mV to 150 MHz < 150 mV to 600 MHz	9	0.1 Hz, 10 Hz, 100 Hz	$169.95
CT-125	10 Hz–1.25 GHz	< 25mV to 50 MHz < 15 mV to 500 MHz < 100 mV to 1 GHz	9	0.1 Hz, 1 Hz, 10 Hz	$189.95
CT-250	10 Hz–2.5 GHz typically 3.0 GHz	< 25 mV to 50 MHz < 10 mV to 1 GHz < 50 mV to 2.5 GHz	9	0.1 Hz, 1 Hz, 10 Hz	$249.95
PS10B Prescaler	10 MHz–1.5 GHz, divide by 1000	< 50 mV	Convert your existing counter to 1.5 GHz		$89.95

SPEED RADAR $89.95 complete kit SG-7

New low-cost microwave Doppler radar kit "clocks" cars, planes, boats, horses, bikes or any large moving object. Operates at 2.6 GHz with up to 1/4 mile range. LED digital readout displays speed in miles per hour, kilometers per hour or feet per second! Earphone output allows for listening to actual doppler shift. Uses two 1-lb coffee cans for antenna (not included) and runs on 12 VDC. Easy to build—all microwave circuitry is PC stripline. ABS plastic case with speedy graphics for a professional look. A very useful and full-of-fun kit.

BROADBAND PREAMP

Boost those weak signals to your scanner, TV, shortwave radio or frequency counter. Flat 25 dB gain, 1 to 1000 MHz. 3 dB NF. BNC connectors. Runs on 12 VDC or 110 VAC.
PR-2, wired, includes AC adapter $59.95

2M POWER AMP

Easy to build power amp has 8 times power gain, 1W in, 8W out, 2W in, 16W out, 5W is for 40W out. Same amp as featured in many ham magazine articles. Complete with all parts, less case and T-R relay.

PA-1, 40W pwr amp kit	$34.95
TR-1, RF sensed T-R relay kit	$11.95

FM WIRELESS MIKE KITS

FM-3 SHOWN

Pick the unit that's right for you. All units transmit stable signal in 88-108 MHz FM band up to 300' except for hi power FM-4 that goes up to 1/2 mile.

FM-1, basic unit	$5.95
FM-2, as above but with added mike preamp	$7.95
FM-4, long range, high power with very sensitive audio section, picks up voices 10' away	$14.95
MC-1, miniature sensitive mike cartridge for FM-1,2,4	$2.95

MICROWAVE INTRUSION ALARM
A real microwave Doppler sensor that will detect a human as far as 10 feet away. Operates on 1.3 GHz, and is not affected by heat, light, or vibrations. Drives up to 100 mA output, normally open or closed, runs on 12 VDC.
Complete kit MD-3 . $19.95

MUSIC MACHINE
Neat kit that will produce 25 different classical and popular tunes, plus 3 doorchime sounds. Lots of fun for doorbells, shop, or store entrances, car horn, music boxes, etc. Runs on 9V battery or wall transformer. Excellent speaker volume and adjustable tempo and pitch. Add our case set for a handsome finished look.

Complete kit, MM-5	$24.95
Case + knob set, CMM-5	$12.95

PACKET RADIO
Two new versions are available for the Commodore 64 (P-64A) or the IBM-PC (P-IBM). Easy assembly "NO TUNING". Includes FREE disk software, PC Board and Full Documentation.

KIT	P-64A	$59.95
	P-IBM	$59.95
CASE	CPK	$12.95

LO NOISE PREAMPS
Make that reciever come ALIVE! Small size for easy installation with Hi-Q tuned input for peak performance. Excellent gain and noise figure—guaranteed to improve reception! Specify band: 2M—PR-10, 220 MHz—PR-20, 440 MHz—PR-40.
Each kit $17.95

TONE DECODER
A complete tone decoder on a single PC board. Features: 400–5000 Hz adjustable range via 20-turn pot, voltage regulation, 567 IC. Useful for touch-tone burst detection, FSK, etc. Can also be used as a stable tone encoder. Runs on 5 to 12 volts.
Complete kit, TD-1 $6.95

VOICE ACTIVATED SWITCH
Voice activated switch kit provides switched output with current capability up to 100 mA. Can drive relays, lights, LED, or even a tape recorder motor. Runs on 9 VDC.
VS-1 kit $6.95

TELEPHONE TRANSMITTER
Mini-sized with professional performance. Self-powered from phone line, transmits in FM broadcast band up to ¼ mile. Installs easily anywhere on phone line or inside phone!
PB-1 kit $14.95

NEW

SPEAKER PHONE

Talk on the phone hands-free, great to put in shop or shack, press the button to answer—no actual phone needed. Works same as commercial units. Talk from anywhere in room, phone line powered—no battery needed. Super for family and conference calls or buy two for hands-free intercom! Add our case set for a pro look.
SP-1 ..... $29.95 Case-CSP $12.95

TICKLE STIK
A shocking kit! Blinking LED attracts victims to pick up innocent-looking can—you watch the fun! Ideal for office desks, parties, nosey know-it-alls!
TS-4 kit $9.95

LIGHT BEAM COMMUNICATORS
Transmits audio over infrared beam up to 30'—use simple lenses to go up to ¼ mile! Hum free, uses 30 kHz carrier. Great for wireless earphones or undetectable "bug."
Transmitter + receiver set, LB56 . . $19.95

FM RADIO
Full-fledged superhet, microvolt sensitivity, IC detector and 10.7 MHz IF. Tunes Std. FM broadcast band as well as large portions on each end. Ideal for "bug" receiver, hobby experiments or even as FM radio!
FR-1 kit $19.95

SUPER SLEUTH
A super sensitive amplifier which will pick up a pin drop at 15 feet! Great for monitoring baby's room or as general purpose amplifier. Full 2W rms output. Runs on 6 to 15 volts, uses 8–45 ohm speaker.
BN-9 kit $6.95

BROADBAND PREAMP
Very popular sensitive all-purpose preamp, ideal for scanner, TVs, VHF/UHF rigs, counters. Lo noise, 20 dB gain, 100 kHz–1 GHz, 9V–12 VDC operation.
SA-7 kit $14.95

•2 METERS
•223 MHz
•440 MHz

$14995

FANTASTIC FM TRANSCEIVERS

SYNTHESIZED—NO CRYSTALS

Ramsey breaks the price barrier on FM rigs! The FX is ideal for shack, portable or mobile. The wide frequency coverage and programmable repeater splits makes the FX the perfect rig for Amateur, CAP or MARS applications. Packeteers really appreciate the dedicated packet port, "TRUE-FM" signal and almost instant T/R switching. High speed packet? . . . . No problem. Twelve diode programmed channels, 5W RF output, sensitive dual conversion receiver and proven EASY assembly. Why pay more for a used foreign rig when you can have one AMERICAN MADE (by you) for less. Comes complete less case and speaker mike. Order our matching case and knob set for that pro look.

FX-146 kit (2 Meters)	$149.95
FX-223 kit (1¼ Meters)	$149.95
FX-440 kit (3/4 Meters)	$169.95
CFX matching case set	$ 24.95

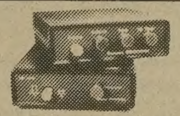
2 MTR & 220 BOOSTER AMP

Here's a great booster for any 2 meter or 220 MHz hand-held unit. These power boosters deliver over 30 watts of output, allowing you to hit the repeater's full quieting while the low noise preamp remarkably improves reception. Ramsey Electronics has sold thousands of 2 meter amp kits, but now we offer completely wired and tested 2 meter, as well as 220 MHz, units. Both have all the features of the high-priced boosters at a fraction of the cost.

PA-10 2 MTR POWER BOOSTER (10 X power gain) Fully wired & tested	$89.95
PA-20 220 MHz POWER BOOSTER (8 X power gain) Fully wired & tested	$89.95

QRP TRANSMITTERS HAM RECEIVERS

20, 30, 40, 80M CW TRANSMITTERS



Join the fun on QRP! Thousands of these mini-rigs have been sold and tons of DX contacts have been made. Imagine working Eastern Europe with a $30 transmitter—that's ham radio at its best! These CW rigs are ideal mates to the receivers at right. They have two-position variable crystal control (one popular QRP XTAL included), one watt output and built-in antenna switch. Runs on 12VDC. Add our matching case and knob set for a handsome finished look.

Your choice of bands (Specify band: QRP-20, 30, 40 or 80)	$29.95
Matching case & knob set, CQRP	$12.95

20, 30, 40, 80M All Mode RECEIVERS

Build your own mini ham station. Sensitive all-mode AM, CW, SSB receivers use direct conversion design with NE602 IC as featured in *QST* and ARRL handbooks. Very sensitive varactor tuned over entire band. Plenty of speaker volume. Runs on 9V battery. Very EASY to build, lots of fun and educational—ideal for beginner or old pro. New 30-page manual. Add the case set for well-fitted professional look.

Your choice of bands (Specify band: HR-20, HR-30, HR-40, HR-80)	$29.95
Matching case & knob set, CHR	$12.95

E-Z KEY CMOS KEYER

Send perfect CW within an hour of receiving this kit! Easy-to-build kit has sidetone oscillator, speed control and keys most any transmitter. Runs for months on a 9V battery. 28-page manual gives ideas on making your own key for extra savings. Add our matching case set for complete station look.

CW-7 kit	$24.95
Matching case knob set, CCW	$12.95

ACTIVE ANTENNA

Cramped for space? Get longwire performance with this desktop antenna. Properly designed unit has dual HF and VHF circuitry and built-in whip antenna, as well as external jack. RF gain control and 9V operation makes unit ideal for SWLs, traveling hams or scanner buffs who need hotter reception. The matching case and knob set gives the unit a hundred dollar look!

AA-7 Kit	$24.95
Matching case & knob set, CAA	$12.95

SPEECH SCRAMBLER

Communicate in total privacy over phone or radio. Kit features full duplex operation using frequency inversion. Both mike and speaker or line in/out connections. Easy hookup to any radio, and telephone use requires no direct connection! Easy to build 2 IC circuit. Can also be used to descramble many 2-way radio signals. Finish your kit off with the handsome case & knob set.

SS-7 kit	$29.95
Matching case & knob set, CSS	$12.95

SHORTWAVE RECEIVER

Fantastic receiver that captures the world with just a 12" antenna! Can receive any 2 MHz portion from 4–11 MHz. True superhet has smooth varactor tuning, AGC, RF gain control, plenty of speaker volume and runs on a 9V battery. Fascinating Scout, school or club project provides hours of fun for even the most serious DXer. For the car, consider our shortwave converter. Two switchable bands (in 3–22 MHz range), each 1 MHz wide—tunable on your car radio dial. Add some interest to your drive home!

Shortwave receiver kit, SRI	$29.95
Shortwave converter kit, SCI	$27.95
Matching case set for SRI, CSR	$12.95
Matching case set for SCI,CSC	$12.95

2, 6, 10 MTR, 220 FM RECEIVERS

Keep an ear on the local repeater gang, monitor the cops, check out the weather or just plain listen around. These sensitive superhet receivers are just the ticket. They tune any 5 MHz portion of the band and have smooth varactor tuning, dual conversion with ceramic IF filters, AFC, adjustable squelch and plenty of speaker volume. Runs on 9V battery and performance that rivals the big rigs! For a complete finished pro look, add our matching case and knob set with screened graphics.

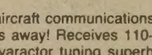
FM communications receiver kit Specify band: FR 146 (2m), FR6 (6m), FR10 (10m), FR-220 (220 MHz)	$29.95
Matching case & knob set, CFR	$12.95

FM STEREO TRANSMITTER

Run your own stereo FM station! Transmit a stable signal in the standard FM broadcast band throughout the house, dorm or neighborhood. Connects easily to line outputs on CD player, tape decks, etc. Runs on 9V battery, has internal whip antenna and external antenna jack. Add our case set for a "station" look!

FM-10 kit	$29.95
Matching case set, CFM	$12.95

AIRCRAFT RCVR



Hear exciting aircraft communications—pick up planes up to 100 miles away! Receives 110–136 MHz AM air band, smooth varactor tuning superhet with AGC, ceramic filter, adjustable squelch, excellent sensitivity and lots of speaker volume. Runs on 9V battery. Great for air shows or just hanging around the airport! New 30-page manual details pilot talk, too. Add case set for "pro" look.

AR-1 kit	$24.95
Matching case set, CAR	$12.95

TERMS: Satisfaction guaranteed. Examine for 10 days. If not pleased return in original form for refund. •Add $3.75 for shipping, handling and insurance. •For foreign orders add 20% for surface mail. •COD (U.S. only), add $5.00. • Orders under $20, add $3.00. •NY residents add 7% sales tax. •90-day parts warranty on kit parts. •1-year parts & labor warranty on wired units.

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RAMSEY ELECTRONICS, INC. 793 Canning Parkway, Victor, NY 14564

CIRCLE 34 ON READER SERVICE CARD

The Dipole Dangler

by Robert J. Wright PY8ZAC/W8VOH

In the mid-60s, the Summer Institute of Linguistics (SIL) here in Brazil was granted permission to use radios for communication between our centers and remote Indian villages. SIL is working here and in other countries with people who speak some of the more than 2,000 unwritten languages of the world. Our purpose is to learn these languages, analyze them, teach the people to read and write their own language, and translate the New Testament for them. Here in Brazil, the linguistic-translation teams live in the Indian villages for periods of from about three to six months at a time, taking a radio with them each time to maintain contact with one of our five centers. We are using a small portable SSB radio with about 15 watts PEP output, powered by any 12-volt source, including dry cells. The antennas are dipoles about 86 feet long. Communications distances range from about 100 miles to over 500 miles.

Because of the importance of radio communications and because the equipment has to be set up and taken down each time by non-technical personnel, one area of potential problems was the antenna system. The antennas had to be reliable, rugged, and easily handled. Because more than 40 stations were involved, they also had to be inexpensive and made from readily available materials. The purpose of this article is to share some of our experiences with you with the hope that some of the ideas might prove useful to you for your home station antennas, or for portable antennas for Field Day use, etc.

The construction of the center insulator is a very important factor in building a reliable dipole antenna. Purchasing a commercial unit was not practical for us because of the cost and also the delay in obtaining it. The center insulator we have been using consists of a standard porcelain insulator with a piece of 1/4-inch plastic in the form of a cross attached to it. See Figure 1. The porcelain insulator provides the necessary strength, and the plastic gives support to the coax cable. The plastic is attached to the insulator with No. 18 solid copper wire, wrapped twice around the insulator and twisted together in back of the plastic. Three holes are drilled in the plastic to support the coax cable.

We have been using flexible, bare-copper antenna wire, and this has proved very adequate. To attach the wire to the center insulator, pass the wire through the hole twice and wrap the end around snugly for a distance of at least three inches. Attach both legs to the center insulator and attach the end insulators in the same way. Do not solder anything at this time. Before going any further, wrap the antenna legs on wooden forms as described below. This makes a neat package to take into the shop to attach the coax cable.

Cut the coax cable to length, unless you want to wait and install the antenna first. Pass the end of the cable through the holes in the plastic, starting from the back as shown in Figure 2. Remove about 12 inches of the plastic jacket. Remove the center conductor from the braid by pulling it through the braid. Do not comb out the braid.

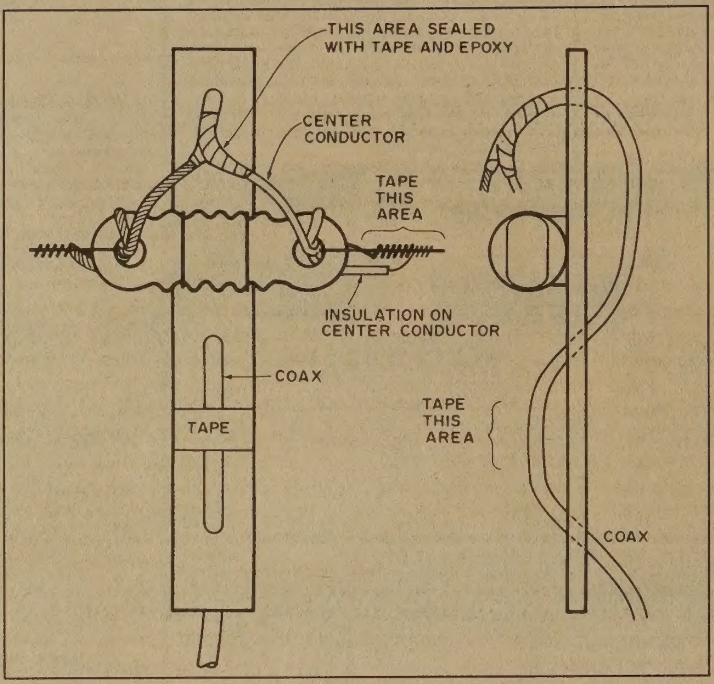
THIS AREA SEALED WITH TAPE AND EPOXY
CENTER CONDUCTOR
TAPE THIS AREA
INSULATION ON CENTER CONDUCTOR
COAX
TAPE
TAPE THIS AREA
COAX

Figure 2. Attaching the coax feedline.

Use standard vinyl tape cut to about 3/8" in width to seal the point where the center conductor leaves the braid. Seal this junction very carefully. After the antenna is completed, we also seal this further with Q-dope or epoxy cement to make it as watertight as possible.

Pass each of the conductors (center conductor and braid) through one of the holes in the center insulator, drawing the braid side tighter than the other so that it will take the strain. Pass the braid through a second time and wrap it over the antenna wire, in the same direction as the original wrapping. Solder the braid to the wire in the middle of the wrapping, leaving the rest free to flex.

Pass the center conductor through the hole a second time and lay it alongside the wrapping on the antenna wire. Mark a halfway point on the wrapping and strip the insulation to this point only. I have found it very easy to strip the insulation from coax by scoring the insulation with wire strippers every 1/4" or so and then crushing the insulation with long-nose pliers to break the adhesion between it and the wire. After this, the insulation comes off relatively easily. Once the wire is stripped, wrap it around the antenna wire a few turns. Do not tin the wire if it is stranded. Solder the center conductor to the antenna wire, making sure that the antenna can be pulled straight without straining the coax inner conductor. Solder only where the conductor attaches to the antenna wire. Reinforce the entire connection by wrapping vinyl tape securely around both the inner conductor and the antenna wire, starting from the center insulator and extending past the solder joint. This is very important because it secures the center conductor to the antenna leg, allowing a minimum of independent movement and reducing the threat of breakage at what is probably the most fragile part of the whole antenna. Tape the coax cable to the plastic support between the lower two holes.

At this point, seal the "V" in the coax with epoxy cement or other sealer and let it dry. Install the coax plug and the antenna is ready for use.

After the antenna is constructed, care in handling is very important to long life (for the antenna). Many of you know the frustrating tangle that you can have with a long dipole antenna that has been coiled up and then uncoiled improperly. To avoid this, we are using wooden forms made from 1/4-inch plywood cut to approximately 5" by 7". Each leg of the antenna is carefully wound on one of these forms to avoid tangling. To use the form, extend the antenna out full length on the ground and carefully check it for kinks. Starting at the end of one leg, carefully wind the antenna on the form by *winding the form onto the wire* while walking toward the center insulator. Do not coil the wire onto the form. Use one form for each leg. When you get ready to re-install the antenna, carefully unwind the wooden forms, leaving the antenna fully extended on the ground. Do not pull the wire from the forms or you will have a kinky mess. Carefully check for kinks or other problems before installing the antenna.

Multiple frequency antennas can be made using a modified center insulator, as shown in Figure 3. Spacers for separating the antenna legs can be made from 3/8" plastic electrical conduit, or the second antenna can be in the form of an inverted "V." In this case, the antenna will need to be five percent longer than a normal dipole.

Using this method of construction and using the wooden forms for handling the antennas, we have had a minimum number of problems with our antennas during these past years. RF

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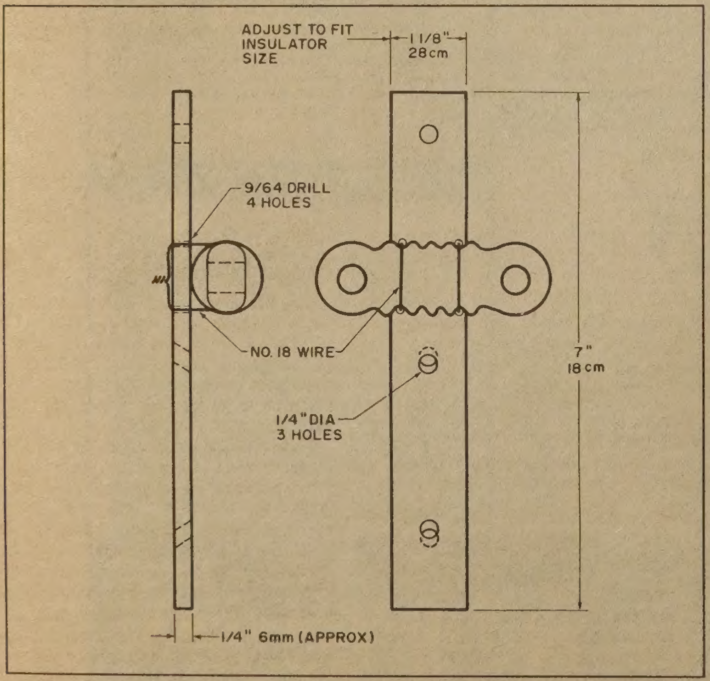

Figure 1. Center insulator.

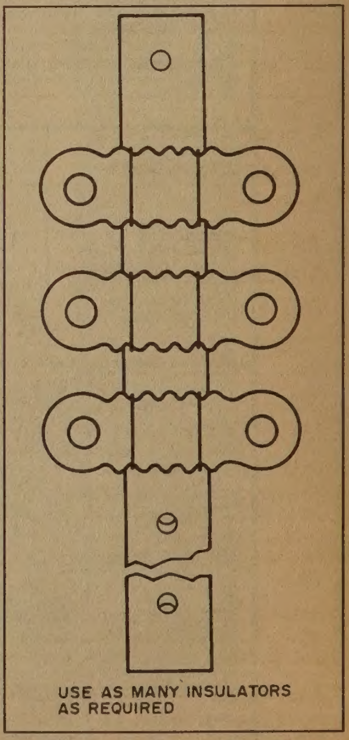

Figure 3. Center insulator for multiple frequency dipole.

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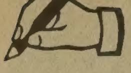
letters



Write to: Radio Fun, 70 Route 202-N, Peterborough, NH 03458

Will Rodina NP2EP, U.S. Virgin Islands First off, I would like to say that I am 16 years old and have been a licensed ham for 14 months. In that time period I have gone from codeless Tech to General class and have found ham radio to be very different from what I learned in the classroom. My instructors told wonderful stories about ham radio, and I was extremely excited about getting my ticket. After getting my Tech ticket and getting on 2 meters, I found the local hams to be very friendly and supportive, and was eager to upgrade and get on HF. Sure enough, I made it to coded Tech and General, and procured a rig to use. Listening on 10 and 15 meters was fun, even when the conditions were poor. However, when I turned to 20 meters, I was shocked and appalled to find that the language and conduct of some hams on this band (especially in the area of 14.313 to 14.315) was no better than some of my schoolmates (the ones nobody hangs out with). What happened to the Amateur's Code—the one that says that a radio amateur is considerate, loyal, progressive, *friendly*, balanced and patriotic? The insults, jamming, racial and ethnic slurs, etc. . . . show that some of today's hams certainly pay no heed to this. And the problem of pirates and bootleggers only adds to the long list of complaints against radio amateurs. The thing that will help clear up some of this Bravo Sierra is not acknowledging any station with poor operating practice. Fellas, talking to jammers only gives them the attention they want and encourages them to continue.

Insulting DX and other hams over the air is another terrible practice. Calling someone stupid and ignorant and saying they can't even speak proper English does nothing to prevent this problem and pushes them towards insulting back (you guys know who you are—the ones who speak seven languages). One of the goals of ham radio is to promote international goodwill, yet by harassing DX stations you encourage them not to come back to other U.S. operators, most of whom would love to work DX.

You may think this is just another letter by a long-winded moron who does nothing to alleviate the problem, or you may call me a snot-nosed young kid with no experience. Big deal. To all you old-timers who cause some of these problems: I'm gonna be around and up on the air *long* after you're living in a box and pushing up daisies. So . . . go ahead! Continue! But once you're gone there will be one less problem on the air. Oh, one other thing: If you hear me—watch out. I'm taking names (and calls).

ET1 Derick Amburgey USN I am an Electronics Tech First Class in the U.S. Navy. I feel a responsibility to write and let others know why ham radio was instrumental in shaping my career. When I was 13 (I am now 27) I was in the school library when a book about amateur radio caught my eye. I started reading it and was fascinated by how people halfway around the world could communicate with each other without wires. This led to more reading and so on. With my curiosity whetted, I began my quest to find out what made such equipment work and, yes, that led to more reading. I enrolled in a VOTECH program my school was part of. I spent two years learning basic electronics and troubleshooting. The more I learned, the more I found out that there was much more to learn.

I graduated from school and planned to go to college, but I did not feel like being in debt from the school loans until I was 35. I saw the commercials on TV for the Air Force and called the recruiter, but they were booked full to the next fiscal year. During this same time my VOTECH training enabled me to get a job with the state of New York repairing educational electronics, tape recorders, VCRs and so on. I liked the work so much that I continued working even when funding ran out and they couldn't pay me. The Air Force recruiter recommended I talk to the Navy recruiter about placement in the electronics field, so I did.

I was amazed at how good the training was and highly recommend it to anyone with an interest in electronics. I spent two years in school before I even saw a ship! The Navy taught theory in the classroom and then made us go to the actual equipment and put it to practice in *every single lesson!* As a matter of fact, 70% of the grading was based on how well you did with the equipment labs. When I arrived at my ship I was designated a crypto tech (communication scramblers), but I worked on everything from hand-held walkie talkies to radar equipment. The important thing to stress is that the schooling *never* stops in the Navy (or elsewhere). The Navy expects its techs to fix anything that is electrical, which makes good sense since you are usually thousands of miles from home and in the middle of nowhere.

My job is rewarding, supports my family, is challenging and satisfies me. I shudder to think what I would be doing if I had not seen that book on ham radio. I am not recruiting for the Navy, and I don't have my license yet (I've been overseas for most of my career). I intend to get my no-code license when I get stateside again. I just wanted to simply state how amateur radio impacted my life and how it influenced me to choose my present (and future) career. I am very grateful for everything that resulted from this and I want to give something back to ham radio and the community when I am stateside again.

I tried joining a ham club here in the Philippines with retired sailors, but when they found out I didn't

Continued on page 30

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RF vintage review

Azden's PCS-3000

by Gerald Haas WA2JSR/4

The PCS-3000 is a "Series II" unit that has a completely different microcomputer system than the original Azden 2 meter rig. It covers an 8 MHz range (142 to 149.995 MHz), has eight memory channels, a backlighted keyboard, provision for three auxiliary offsets (CAP and Air Force MARS are already included), selectable frequency steps of 5 or 10 kHz, and a NiCd battery for memory back-up. The radio also comes with a free Touch-Tone™ pad kit.

Interesting, you say? Well, there's more. The above are self-explanatory, but some of the features will have to be described in detail. These include the microcomputer acquisition tone, discriminator scan stop, programmable band scan, auto-resume with delay, memory retention of offsets, and repeater input monitoring. Let's look at these one at a time.

Microcomputer Acquisition Tone

When you first switch on the PCS-3000, it will make a short "tweep" sound. Each time you press one of the buttons on the 12-key microcomputer control keyboard you'll hear the same sound. The first time I experienced this, I found it to be quite entertaining. But it's very informative as well. Once you get used to it, it's hard to feel comfortable without it. I suppose it provides some kind of psychological reinforcement, removing all doubt that the microcomputer has gotten the message. All psychoanalysis aside, though, I like this feature.

Discriminator Scan Stop

The PCS-300 makes use of an exclusive circuit which requires two conditions for the scanner to stop: presence of carrier and frequency centering. Unless the carrier is within a certain range of center frequency, the scanner will keep on going. This circuit allows the radio to scan in steps of 5 kHz without stopping one channel too soon. (Although the carrier is inside the passband when the receiver is 5 kHz below frequency, it isn't centered, so the scanner does not stop.)

Programmable Band Scan

Any section of the frequency range, 142 to 149.995 MHz, can be scanned in increments of either 5 kHz or 10 kHz. The lower- and upper-limit frequencies are stored in memory channels 7 and 8, respectively. In general, it's probably best to program the lowest commonly used channel into memory 7 and the highest one into memory 8. I programmed 146.52 into memory 7 and 147.00 into memory 8.

The offset in the band-scanning mode is determined by the offset written into memory 8, except for the lower-limit frequency offset, which is the offset stored in memory 7. In my case, channel 7 was programmed for simplex and channel 8 for -600 kHz. The rig was thus set up for simplex at .52 and -600 split at all the other scanned channels.

Auto-Resume with Delay

There are three scanning modes, F, B, and V, chosen by the front-panel Scan/Offset switch. These letters designate free sampling, busy, and vacant scanning modes.

In the F position, the scanner goes along until it hits a busy channel, and then it stops for about five seconds. During this time you can choose either to remain on frequency (by pressing a certain keyboard or microphone button) or to continue scanning (by just waiting). If you decide to continue scanning, the unit will start up again after the five-second delay and continue until it gets to the next busy channel, where it will stop again for five seconds, and so on.

In the B position, the radio scans until it hits a busy frequency and then stops. If the carrier drops out, the unit will start scanning again after a delay of a second or so. Again, you can choose whether or not to stay on frequency by means of the same stop command buttons.

Sometimes I have wanted to stay on frequency but forgot to press a stop command button. The short delay before the radio resumes scanning is very helpful here, because the repeater will usually come back up again before the delay time is up.

In the V position, the radio skips over busy channels and stops at vacant ones. If a signal comes on, the radio moves up to the next vacant channel right away, unless a stop command key has been pressed.

Memory Retention of Offsets

Each of the eight memory channels retains a frequency and one of three offsets (simplex, -600 kHz, or +600 kHz). Programming is simple: Just dial up the desired frequency and offset, set the memory address to the appropriate channel, and press M WRITE. When that channel is recalled, the receiving frequency is displayed while receiving and the transmitting frequency is displayed while transmitting. Pure and simple!

Repeater Input Monitoring

There is a little switch on the side of the microphone labeled "CH LOCK." When this switch is actuated, the *receiver* goes to the *transmit* frequency. If you transmit, the transmitter frequency remains as programmed. This feature is useful if you want to listen to the repeater input frequency instead of the output frequency.

Keyboard Operation

It takes quite a while to learn the operation of this very advanced and sophisticated radio, and I certainly am not going to try to cover all the details here. What I'd like to do, though, is give you some idea of how the thing works, and some idea of how versatile it really is. So let's look at the keys, briefly, one at a time.

The MHz UP key advances the MHz figure only, in the range of 2 to 9, in upward steps of 1 MHz. That is, as this key is pressed over and over, the MHz figure changes in the sequence 2, 3, 4, 5, 6, 7, 8, 9, 2, 3, and so on. No other digits are affected.

The 100K UP key advances the 100 kHz digit upward without changing the MHz figure or the unit kHz figure. Example: You have the frequency 6.940 displayed and actuate the 100K UP key, giving a new display of 6.040. Actuate the 100K UP key again, and the display becomes 6.140. The 100K DOWN key reverses this, so if you have 6.140 and hit the 100K DOWN key twice, you will be back on 6.940. It takes a little getting used to.

The 5/10K UP key advances the unit kHz digit by either 5 or 10 kHz, depending on the setting of a push-button lock switch on the front panel. Suppose this switch is set for 5 kHz steps and you are on 6.940. Hit the 5/10K UP key and you go to 6.945. If you actuate this key over and over, the frequency will increase by 5 kHz steps until you are at 6.995, and then it will go down to 6.000. The frequency is thus tunable within a 1 MHz range using this key. By holding the key down, the radio will move upward very rapidly in 5 kHz steps. This gives a "VFO" feeling. The 5/10K DOWN key just reverses the process of the 5/10K UP key.

The BAND SCAN key causes the radio to scan in steps of 5 or 10 kHz (as selected by the push-button lock switch I mentioned above) between two limit frequencies which can be selected at will by the operator. The lower-limit frequency is the channel in memory 7 and the upper limit frequency is the channel in memory 8. Band scanning starts at the lower limit and moves upward.

The +/-600 SHIFT key puts the radio in the simplex, -600, or +600 offset modes by repeated actuation. Just to the left of the frequency display, small LEDs indicate the offset.

The five keys M ADRS, M SCAN, M1 CALL, M CALL, and M WRITE accomplish memory programming, recall, and scanning. The functions of these keys are pretty much self-explanatory. Memory can be easily reprogrammed. When power is turned off, memory is held by a NiCd battery that is constantly charging while the radio is on. You can therefore put the radio away for a few weeks, then put it back on the air, and you'll still have the same memory channels and offsets.

Inside the Radio

The PCS-3000 uses modular construction (as any state-of-the-art radio does nowadays, after all). Interior layout is neat and rugged. Circuit boards are secured to the heavy-duty chassis with several screws. The VCO/PLL section is isolated electrically by means of a shielded enclosure and is padded with wax to minimize microphonics. The layout is orderly and the component designations are marked on the boards.

All circuit boards are easily removed and replaced, since all interconnecting wires unplug and their pin positions are clearly marked. Taking one of the boards out of the radio and visually examining the underside, it is apparent that the manufacturers have taken care to do a neat job of soldering. There are no sloppy connections, bridges, or cold joints.

The control-head section of the PCS-3000 is greatly miniaturized, but the logical modular construction will make it easy to service.

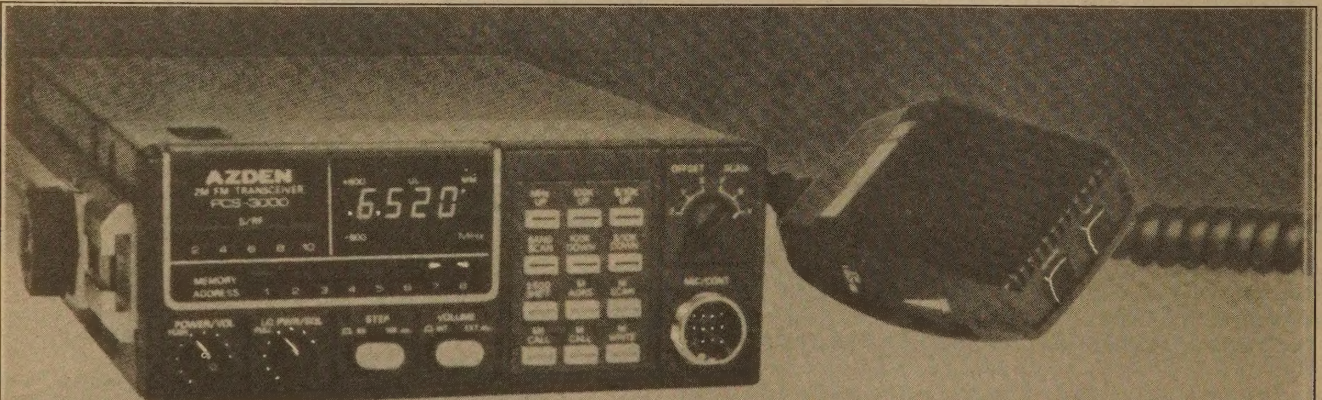
Internal adjustments of PL tone frequency, PL tone-deviation, high power and low power, as well as auxiliary offset crystals, are located on the PC board on the top of the main unit. PL tone frequency is adjusted by a blue pot, VR412; PL level is adjusted by VR411 (these are both near the rear). High power is adjusted by VR408 and low power by VR407, both near the center of the board. Auxiliary offset crystals are near the front, and can be "pulled" to move the offset up or down, via adjacent inductors, by as much as 15 kHz.

Performance

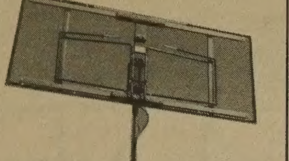
Of course, all this microcomputer convenience is great. But how does the unit perform? I connected my new PCS-3000 to a fixed outdoor antenna and wattmeter/SWR bridge, and after getting acquainted with the microcomputer, I ran some tests.

My radio, on my particular wattmeter, puts out 27 watts in high power and 6 watts in low power with a 1.1:1 SWR on the antenna. (The PCS-3000 is SWR protected to the point that you can transmit into an open or short circuit; high SWR will no doubt result in lower power output, but you don't have to worry about burning out the final amplifier.) The low-power level is internally adjustable by means of a potentiometer, VR407, in the center of the board on top of the main unit, over a range of ze-

Continued on page 21



The PCS-3000 measures 6-3/4 inches wide by 2-3/8 inches high by 9-3/4 inches deep. The unit comes apart into two pieces: the "control head" (which houses the microcomputer and displays, and is 6-3/4 inches wide by 2-3/8 inches high by 2-5/8 inches deep) and the "main unit" (containing the transmitter and receiver circuits). In my car, only the control head is actually mounted under the dashboard, saving much space. The main unit is under the passenger seat. An optional interconnecting cable provides the electrical interface between the two units.



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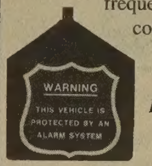

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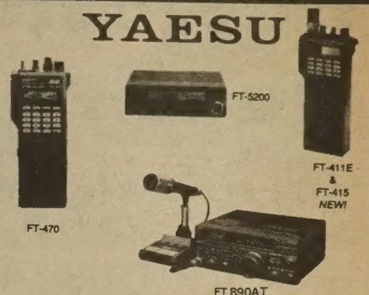

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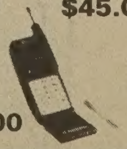

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Folding Cubical Quad

by Gerald F. Gronson K8MKB

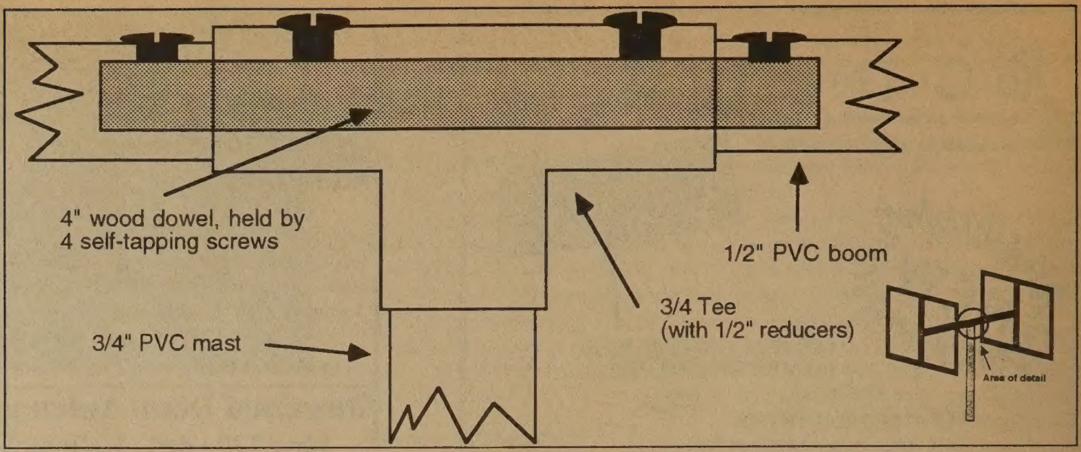

Figure 2. Close-up of the center support.

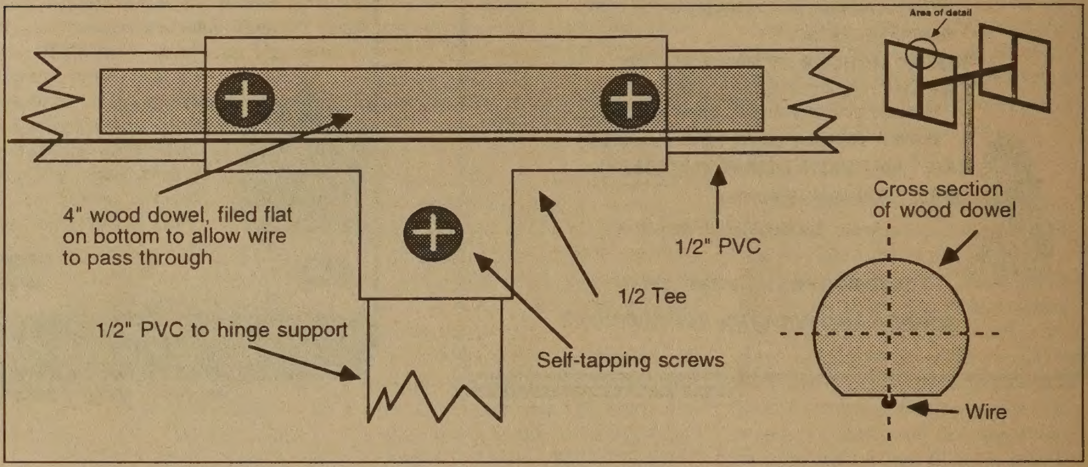

Figure 3. Top and bottom of the 1/2" tee assembly.

You say you live in an apartment with tight antenna restrictions, or you'd like a directional antenna that's easy to use? Something with gain and directional characteristics would be nice. Well, this antenna might be just what you're looking for!

The cubical quad has been around for a long time. Compared to the yagi, it is quite effective, is easier to construct and adjust, and has good directional characteristics. This edition, a neat and effective antenna, can be built from materials available in just about any hardware store! Plastic PVC plumbing pipe is the main building material. The conductor is #14 solid grounding wire, and CRAZY glue or self-tapping screws can be used in the construction.

The antenna has a theoretical gain of 5-7 dB, as compared with a dipole. It folds flat (almost), is reasonably rugged, and can be tuned! It was not designed to be used as a permanent outdoor antenna—there are other antennas on the market for that.

Cutting the parts to the highest frequency of the 2 meter band is the best approach. The wire will have some "wave" to it in the finished unit—that means the total length will be slightly longer than any calculated length. That's OK, because provision for tuning has been made. Say you cut the pipe for 148.00 MHz with the wave, the wire is slightly longer and resonates to 147.87 MHz, and you are shooting for 146.00 MHz. The antenna can be tuned externally. You don't have to take it apart, just adjust the tuning stub by moving the shorting bar. A piece of RG-59 can be used as a matching stub if you would like to experiment. Also, the directional characteristics, as well as forward gain, can be adjusted by varying the spacing between the elements.

How's that for an antenna that has a lot of versatility built in? Plus, it folds flat for easy transport and storage! As a bonus, no parts come off once it's been assembled.

Construction

In constructing the device, it's best to use a tubing cutter. Carefully mark the PVC with a hobby knife to give the cutter blade a place to start accurately. After fitting the segments together, tap them together to assure a tight fit. Take measurements of the "fit together" then frame to make sure the dimensions are correct. Take the element apart, and pass the wire through as though stringing beads. Oh yes, the wire has to be about a foot longer to make assembly easy. It's the PVC that determines the dimensions of the wire, and therefore the resonant frequency. You cut the excess wire off after the final assembly. If you do "mess up" it's no problem; the materials are cheap and readily available. A Radio Shack SWR meter is a handy device to aid in tuning the antenna.

Once again, the Michigan Midnight Mobileer and the

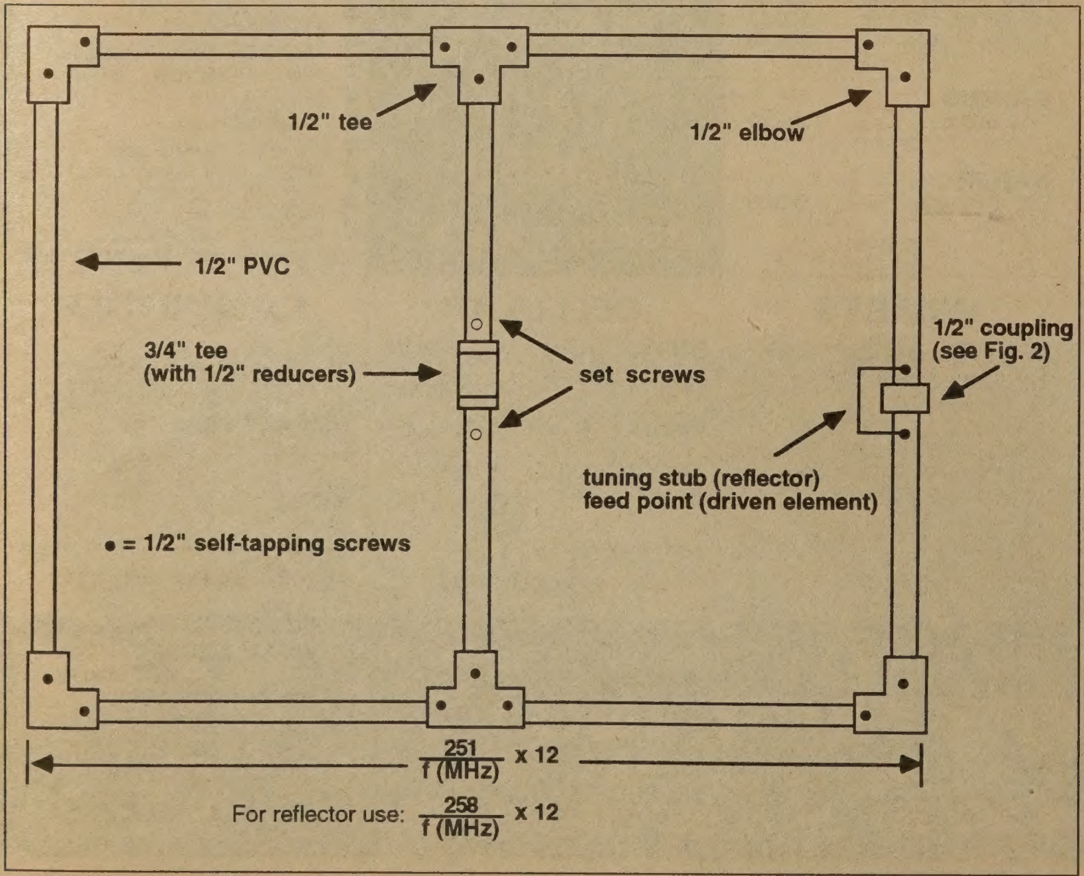

Figure 1. Reflector and driven element construction details.

Parts List

Quantity	Material
8	1/2" PVC elbows
4	1/2" to 3/4" PVC reducers
3	3/4" PVC tee's
4	1/2" PVC tees
16'	#14 ground wire (solid)
2	1/2" PVC Couplers
10'	Length of 1/2" PVC
3'	Length of 3/4" PVC
4 dozen	3/8" or 1/2" self-tapping screws #6 or #8

Parts Suppliers

Wire:
Fair Radio Sales Co.
P.O. Box 1105
Lima OH 45802

Coax tuning stub:
Radio Shack—Local stores.

Materials other than electronic parts:
ACO Hardware stores
K-Mart stores

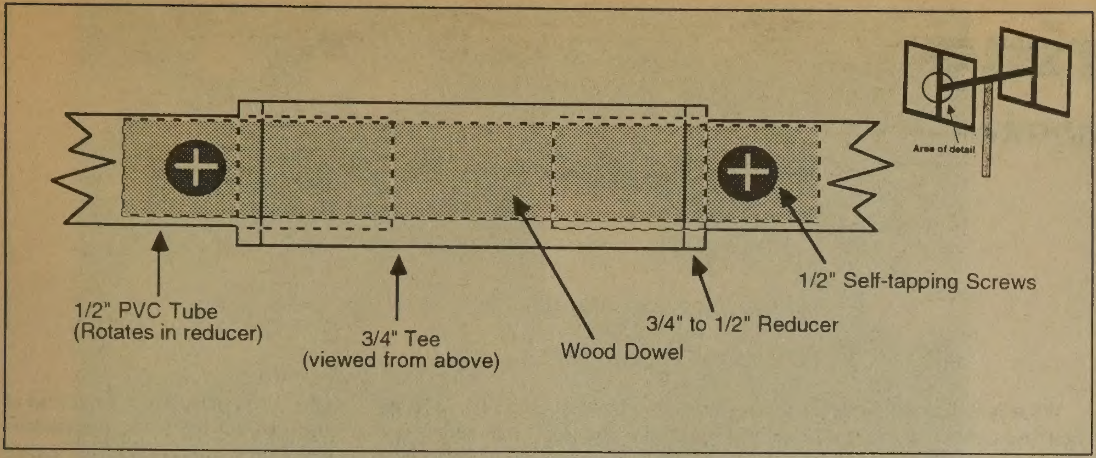

Figure 4. Hinge detail.

Munchers' Net gave me a signal report, and were helpful in testing this antenna. Thanks to K8BOU, KB8OU, VE3TDC, VE3LFZ and the gang. Your comments were helpful and gratifying.

I really hope you find this antenna to be a solution to the problem of getting out in a restrictive environment. And even if you have a good QTH to operate from, you just might have some fun with the first ever "Folding Cubical Quad." **RF**

References: *The Radio Amateur Antenna Book* by William I. Orr and Stuart D. Coan; published by Radio Publications, 1987, pp. 164-165.

ARRL Antenna Book, 1974, p. 226.

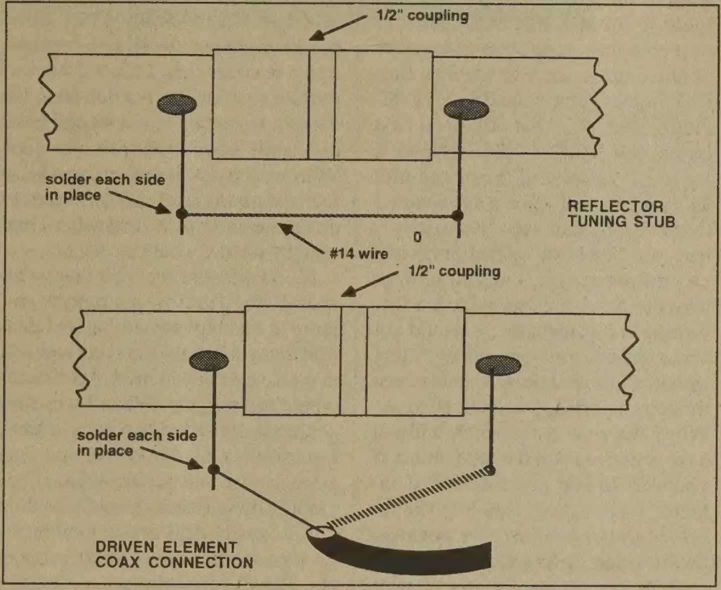
1/2" coupling
solder each side in place
REFLECTOR TUNING STUB
#14 wire
0
1/2" coupling
solder each side in place
DRIVEN ELEMENT COAX CONNECTION

Figure 5. Attaching the coax feedline to the driven element and the tuning stub to the reflector.

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HT'S

MODEL	DESCRIPTION
TH-225A	2M 5W SCANNG DEL
TH-28A	2M 2-5W MICRO 40ME
TH-48A	70CM 2-5W MICRO
TH-78A	2M/70CM DEL DUAL B

MOBILE VHF/UHF

MODEL	DESCRIPTION
TM-241A	2M 45W PROG MIC
TM-331A	220MHZ 25W PROG MIC
TM-441A	440MHZ 25W PROG MIC
TM-741A	2M/70CM/? TRIBANDER
TH-641A	2M 25W ALL-MODE
TS-790A	2M/70CM SATELLITE

HF EQUIPMENT

MODEL	DESCRIPTION
TS-140S	HF COMP GEN COV
TS-690S	HF/6M COMP GEN COV
TS-450S	HF DELUXE COMP
TS-450S/AT	HFDEL COMP TUNR
TS-850S	HF 12V DEL DDS
TS-850/AT	HF 12V DEL TUNR
TS-950SDX	HF THE DX MACHINE!

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ICOM

HT'S

MODEL	DESCRIPTION
IC-02AT	2M 5W 10MEM DTMF
IC-2GAT	2M 7W 15MEM DTMF
IC-2SAT	2M 2-5W DEL MICRO
IC-2SRA	2M/SCANNER HT
IC-24AT	2M/70CM DEL MICRO
IC-3SAT	220M 2-5W MICRO
IC-4SAT	70CM 2-5W MICRO
IC-4SRA	70CM/SCANNER HT
IC-4GAT	70CM 7W 15MEM DTMF
IC-W2A	2M/70CM DUAL MICRO

MOBILE VHF/UHF

MODEL	DESCRIPTION
IC-229A	2M FM, 25W 20MEM
IC-229H	2M FM, 45W 20MEM
IC-3220A	2M/70CM 25W 40MEM
IC-3220H	2M/70CM 45W 40MEM
IC-2410	2M/70CM 45W DEL.

HF EQUIPMENT

MODEL	DESCRIPTION
IC-728	HF COMPACT GEN COV
IC-729	HF/6M COMP GEN COV
IC-735	HF DELUXE COMPACT
IC-751A	HF 12V BASE TXCR
IC-765	HF DELUXE TNR,PS
IC-781	HF DX'ERS DELIGHT

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HT'S

MODEL	DESCRIPTION
FT-411E	2M 2-5W 50MEM,CTCSS
FT-811	70CM 2-5W 50MEM
FT-470	2M/70CM 2-5W 50MEM
FT-26	2M-5W WITH/DTMS PAGING
FT-76	440MHz-5W WITH/DTMS PAGING
FT-415	2M 5W HT TXCR
FT-815	440 MHz 5W HT TXCR
FT-212RH	50W 2M COMPACT MOBILE

MOBILE VHF/UHF

MODEL	DESCRIPTION
FT-290RII	2M 25W ALL-MODE
FT-690RII	6M 10W ALL-MODE
FT-736R	2M/70CM 220//1.2 SAT
FT-5200	2M/70CM DUAL BAND
FT-6200	70CM/1.2 DUAL BAND
FT-2400H	2M 50W,LCD,CTCSS
FT-790RII	70CM 25W ALL-MODE

HF EQUIPMENT

MODEL	DESCRIPTION
FT-747GX	HF LGTWGT MOBILE
FT757GXII	HF COMP GEN COV
FT-767GX	HF 2//220//70C TUNR
FT-990	HF 12V DEL TUNR +
FT-1000B	HF BASIC VERSION
FT-1000D	HF QSL CATCHER!!
FT-890AT	HF DEL MOBILE DOS

YAESU

DIAMOND ANTENNA

MODEL	DESCRIPTION
NR-770H	2M/70CM 3/5 DB MOB ANT
NR-770R	2M/70CM 3/5.5 DB MOB
SX-100	100 M 1.6–60M 30/300/3kW
SX-1000	1000 M 1.8–160/-1300
SX-200	200 M 1.8–200M 5/20/200W
SX-400	400 M 140–525M 5/20/200W
SX-600	600 M 1.8–60/140–525 200W
X-200A	2M/70CM 8.3 H 6/8 DB
X-300	2M/70CM 6.5/9 DB
X-500A(N)	2M/70 8.3/11.7 DB
X-500HNA	HD REPEATER VER X-500
X-50A	2M/70CM 5.6'H 4.5/7.2 DB
X-700	2M/70CM 24'H 9.3/13 DB

rfconcepts

MODEL	DESCRIPTION
2-117	144MHz AMP10WIN 170WOUT
2-217	144MHz AMP 2WIN 170WOUT
2-23	144MHz AMP 2WIN 30WOUT
2-317	144MHz AMP 30WIN 170WOUT
2-417	144MHz AMP 45WIN 170WOUT
2/70	DUAL 3–30W 2M/5–20W 440
2/70G	PREA 3–30W 2M/5–20W 440
3-112	220MHz 10WIN 120WOUT
3-211	220MHz 2WIN 110WOUT
3-22	220MHz AMP 2WIN 20WOUT
3-312	220MHz 30WIN 120WOUT
4-110	440MHz AMP 10WIN 100WOUT
4-310	440MHz AMP 30WIN 100WOUT
4-32	440MHz AMP 3WIN 20WOUT
RFC-2/70	DUALBAND AMP 5WIN 25WOUT

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MODEL	DESCRIPTION
ISOLOOP	14–30MHz HF ANTENNA
ISOPOLE144	2M BASE VERTICAL
MM-3	TRAINER/KEYER
PCB-88	IBM COMP. PLUG-IN BRD
PK-232MBX	ALL-MODE RTTY, CW
PK-88	PACKET TNC 300/1200 BAND

KANTRONICS

MODEL	DESCRIPTION
DATA ENGINEER	TNC SOFTWARE
KAM	CW/RTTY/PACKET/FAX TNC
KPC-2	300/1200 BAUD PACKET TNC
KPC-2400	300/1200/2400 TNC
KPC-4	DUAL PORT VHF PACKET TNC

DAIWA

MODEL	DESCRIPTION
CN101	METER 1.8–150 MHz 15/1.5K
CN103	140–525 MHz SWR/PWR METER
CN410M	3.5–150 MHz SWR/PWR MTR
CN460M	140–450 MHz SWR/PWR MTR
CN465	METER 140–450 MHz 15/75W
CN520	METER 1.8–60 MHz 200/2kW
NS660A	METER 1.8–150 MHz 30/3kW
NS660PA	METER 1.8–150 MHz 3kW
NS663BM	SWR METER BASE UNIT
NS663BN	METER 150–525 MHz 300W

cushcraft CORPORATION

MODEL	DESCRIPTION
A3S	ANT HF 10/15/20M 3 EL STAI
A3WS	ANT HF 12/17M, 3 EL, 8DB, STAI
A4S	ANT HF TRIBANDER 10/15/20
AP8	ANT HF 80–10 WARC VERTICAL
AR-10	TEN METER RINGO
AR-2/70	2M/70CM BASE VERTICAL
ARX-220B	220 MHz VERTICAL
ARX-2B	VHF 2M VERTICAL
AV3	HF 20/15/10M VERTICAL
AV5	ANT HF 80/40/20/15/10 VERTICAL
R5	HF 20/17/15/12/10 VERTICAL
R7	7, 10, 14, 18, 21, 24, 28M VERTICAL

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MODEL	DESCRIPTION
RM-35M	POWSUP 19" RACK 25, 35AC
RM-50M	POWSUP 19" RACK 35, 50AC
RS-12A	POWSUP 12V, 9A CONT 12SUR
RS-12M	12V, 9 C 12S W METERS
RS-12S	POWSUP 12V 7.5 10C SPKR
RS-20A	POWSUP 12V, 16 CON 20 SUR
RS-20M	POWSUP 12V 16C 20S W MET
RS-20S	POWSUP 12V 16, 20C SPKR
RS-35A	POWSUP 12V, 25 CON 35 SUR
RS-35M	POWSUP 12V, 25C, 35S W MTR
RS-50A	POWSUP 12V, 35 CON 50 SUR
RS-50M	POWSUP 12V, 35C 50S W MET
RS-7A	POWSUP 12V 5A CON 7A SUR
VS-20M	16A, 20C MTR VOL/CUR CON
VS-35M	POWSUP 12V25C 35S MET VA
VS-50M	POWSUP 12V35C 50S MET VA

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CIRCLE 162 ON READER SERVICE CARD

Ham on a Shoestring

Get the most from the used equipment market.

by Ken Gledhill AA7PE

I raise a few eyebrows in disbelief when I tell my fellow hams that within the past year I bought both my 2 meter mobile rig and my five-band HF rig for a combined cost of less than $100. Many people are turned away from ham radio as a hobby by the heavy price tags on some of the new rigs. It's not uncommon to see some of the state-of-the-art units sporting price tags of nearly $5,000. Other would-be hams are turned away by the massive quantity of ancillary hardware that garnish many hamshacks. They believe that all that "stuff" is required to be a ham.

The Used Electronics Market

Retail electronics is certainly one of the fastest growing segments of our economy, but it is a tough, competitive business. What may be new and innovative one day may be mundane and obsolete the next. For us hams, this phenomena is both bad and good. It's bad because as an investment, few things maintain their value less than new electronics. When we buy a new rig, it usually drops in value before we even leave the store with it. However, the economics of electronics is a two-edged sword. With reasonable planning, we can take advantage of the depressed resale market of electronic gear. As an example, consider a closely related microcomputer market. It is not uncommon to see classified ads in the newspaper where two nearly identical computer systems are offered for resale but the asking prices differ by more than a two-to-one ratio. In fact, so rapidly do prices change in the computer field that frequently used equipment is offered for resale at prices above the sticker price of an equivalent new system.

Fortunately (or unfortunately), resale prices for used ham gear are somewhat less volatile than computer equipment, but the effect is similar. Nobody really knows exactly how much used ham gear is worth. The appropriate resale price for any one particular item depends upon: (1) its condition and state of repair; (2) how many people there are who are interested in buying it; (3) how easy it is for potential buyers to find similar equipment; and (4) the retail price of a similar new item.

Often a piece of electronic gear loses value only because new innovations have taken place since its introduction, and not because the item itself is bad or of low quality. An example of this phenomena is the Drake TR4 series—a tube type HF rig. Twenty years ago, these rigs brought big bucks as the epitome of a well-designed ham radio. The transistor rigs have justifiably overtaken rigs such as these on the new equipment market, but there are many older rigs that are still in excellent condition and make good first ham stations for those of us with less than $300 to spend.

Used equipment is no panacea, though. Most often there are no warranties, guarantees or even exchanges on used equipment. (There are no complaint departments at hamfests.) Wise and careful buying is your best hedge against getting burned on a piece of used ham gear.

Risk-Reducing Ideas

To alleviate some of the risk in buying used ham gear, let's explore some ideas that should improve your chances of getting yourself a great used rig for the right price.

What is it that you want or need first? As unlikely as it seems, many would-be used equipment buyers are not sure of what it is that they really want to buy. Often people begin by looking for anything that seems to be a bargain—regardless of whether or not it makes sense to use their limited funds in that way. Begin by deciding what it is that you need first before you actually strike out to look for used equipment. For example, let's suppose that you are a newcomer to the hobby and are not actually a ham yet. You have limited funds and no equipment yet, but you plan to take the Novice exam within a few weeks. In this instance, it would not make sense to use your money to buy a good multiband beam antenna even though the price is hard to pass up. Why? Because the antenna without a rig is useless. On the other hand, if you were to buy a rig without an antenna, you could at least run the receiver with a random wire antenna. By listening to live CW QSOs you could better prepare for your license exam. Later, when you got your ticket, a wire antenna would suffice for a while until you could save the funds for a beam.

By being methodical and by deciding what you need before you shop, you are much more likely to make a wise choice. You may find that what you need most is not always the most glamorous item on your list. It is at times like these that it is most tempting to use your hard-earned cash for something flashy or cute. Making a list prior to your shopping is a big help. For example, Table 1 shows the priority vs. feature list that I made before I went to the recent hamfest in Scottsdale, Arizona. I was looking for a good quality HF rig to replace the one that I had sold a few days prior. Since I run a fair amount of CW, I placed a high priority on having a variable bandwidth. Notice, too, that I was looking for a rig that would operate on the WARC bands—rarity in older rigs. I placed the importance of having a solid-state rig down a ways on the list since I have had really good luck with tube rigs. With such a list, it was easy to keep focused on my goal. I didn't want to get home and realize that what I had bought wasn't what I needed.

If you are not sure what you want, spend time finding out before you jump in and buy something and then find that your money is gone and you don't have what you need. Ask friends what they suggest. When I was first getting interested in becoming a ham, I got some really good help and suggestions from my ham friends regarding these issues. Sometimes they will let you borrow one of their backup rigs or listen in while they operate. These opportunities will really improve your vision of what you need. One word of caution though: If your friends are better heeled than you are, carefully watch to determine which of the whistles and buzzers on their rigs are necessary and which ones are just fluff.

What are your technical capabilities? Technical know-how can really pay off when buying used equipment. As I have roamed around hamfests asking how used equipment works, I have received responses ranging from, "It just came back from the factory completely realigned," to "It doesn't work and I can't figure out why." If you have the time, resources and skill, there are some really good bargains to be found at hamfests, but if you are not technically able to rework a faulty radio, you may want to opt for another approach.

My first HF rig was an old Heath HW-101 that I bought for $50 at a hamfest. The seller said that he didn't know if it worked or not (which usually means that it doesn't). It came with a fire hazard power supply. I knew that, as a minimum, the power supply had to be rebuilt; but the basic parts looked pretty good. It took four weeks of work and another $25 in tubes and capacitors to put the rig on the air. The Heath was a particularly good bet because the documentation was complete. I knew that I could start from zero and go completely through the radio following the manual, if necessary. Rigs like the Heath are generally available for $150 to $200 in good condition, so my work saved me a bunch of money.

On one other occasion I had a much more difficult time, though. I bought a beautiful-looking Yaesu FT-DX 400 HF transceiver at a hamfest for $175. The person who sold it to me said that "it worked, sort of." When I got it home and put it on the bench, it operated miserably. I could only hear a few of the strongest signals on the 20 meter band. Reception on the other bands was almost non-existent. The Yaesu people in California sent me the schematic, free—a nice gesture considering the unit had been out of production for many years. By going through the rig inch by inch, I found that someone had grossly modified the unit, including putting 150 VDC on the crystal filter and a dead short across the 10 meter input coil!

Photo A. Gems or gyps? Some older used equipment for sale at the SARC hamfest.

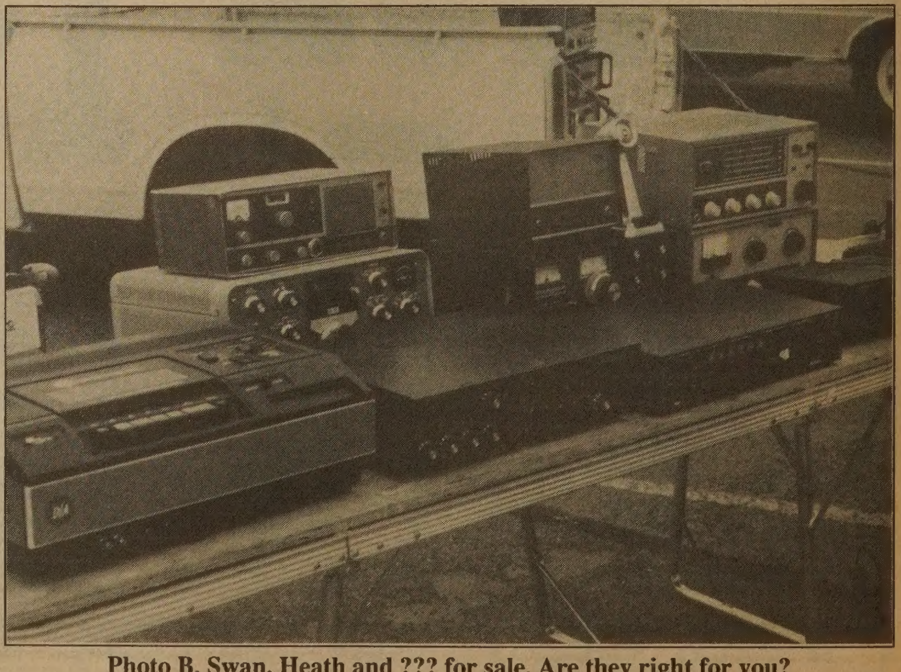

Photo B. Swan, Heath and ??? for sale. Are they right for you?

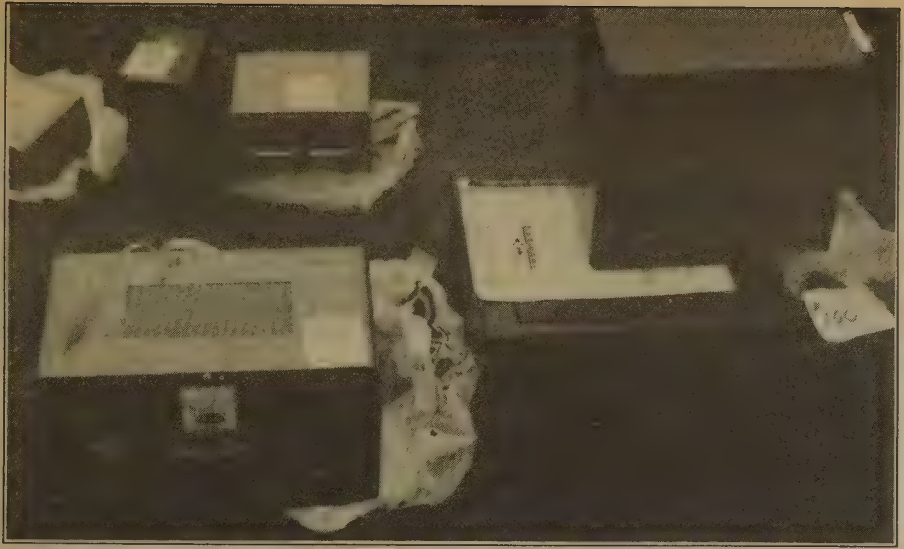

Photo C. These units may be best used by collectors rather than newcomers.

I found no less than a dozen errors in the receiver's factory wiring and the alignment was way out of whack. Four months of evenings and weekends brought the receiver portion up to snuff, and I was well into the transmitter when I sold it.

There is a sequel to this story. I sold the rig for about half what it would have been worth if it was working to an electronics technician who was not yet licensed as a ham. He planned to finish the transmitter repair and alignment job himself as he worked on getting his ticket.

The repair and alignment of the Yaesu was a challenge for even technically oriented hams. If you are less experienced, it is best to buy your first rig in a situation that allows you to test and try it out first. If you are not at a hamfest, many hams will let you try out a rig before you buy it. Also, some cities have ham stores that sell reconditioned equipment that carries a limited warranty. This is also a good hedge if you are afraid of getting a lemon. You may pay a bit more, but the chances of getting stung are reduced considerably.

Why is this equipment for sale? It is usually difficult to determine why a particular piece of used equipment is for sale, but you should always try to find out anyway. There are a number of legitimate reasons why equipment comes up for resale. The possibilities include: (1) the previous owner is upgrading to a newer model with more innovations; (2) the previous owner has unfortunately lost interest in ham radio; (3) the previous owner has come upon hard financial times; or (4) the person selling the rig likes to fix up old rigs and resell them. Consider, however, the following possible reasons for selling a rig: (1) the previous owner didn't like its excessive frequency drift; (2) the rig doesn't cover all of the 10 meter band; or (3) the previous owner has had it in for repair several times. You should ask why the rig is for sale, but the answer may take some interpretation on your part.

Some Parting Shots

By exercising planning and patience, you can find some great deals in used equipment out there, but skipping out to buy the first rig that you come across is a risky business. Make lists, read equipment reviews, consult with friends and look around. Most hams love to help newcomers; and remember, your local amateur radio clubs can be a great source of help, too. Good luck! RF

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13. 6 meter operation possible.
14. Matching speaker.
15. 160 meter operation possible.

This is the priority vs. feature list I used as I looked for a used HF rig at the recent SARC hamfest in Scottsdale, Arizona. I settled on a Drake TR-4 rig, which satisfied all of my wishes except for items #12 and #13.

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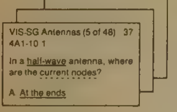

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FAR Scholarships Announces Winners

The Foundation for Amateur Radio, Inc. has announced the 1992 winners of the 43 scholarships it administers. These scholarships were open to all radio amateurs meeting the qualifications and residence requirements of the various sponsors. The Foundation is a non-profit organization, incorporated in the District of Columbia, representing more than 50 clubs in Maryland, the District of Columbia and northern Virginia. It is devoted exclusively to the scientific, literary and educational pursuits that advance the purposes of the Amateur Radio Service. For a list of the 1992 winners and information about the 1993 awards, contact: FAR Scholarships, 6903 Rhode Island Avenue, College Park MD 20740.

FCC: No More SAREX Waivers Needed

Since the beginning of manned amateur radio operation from space, it has been necessary to obtain waivers from the FCC for every astronaut operator of a SAREX station. This was because FCC rule 97.207(a) required the operator of an "amateur radio space station" to hold an Extra class license, and none of the astronauts who have operated from space ever did.

Bowing to requests from the amateur radio community and SAREX planners, the FCC on July 1st revised Section 97.207(a) to authorize any amateur radio license holder to be the control operator of a space station, subject to the privileges of the license class held by that operator. The FCC defines a "space station" as being any amateur radio station that is located more than 50 kilometers above the earth's surface and which transmits and receives on frequencies that are allocated specifically to the Amateur Satellite Service.

But with this change come two caveats. First, the FCC chose not to define a "spacecraft" as being a "ship," thus opening the door for virtually any licensed individual with the necessary dollars and initiative to put up a space station of his own. Although this is certainly not likely, it is interesting that this possibility now exists.

Of even greater consequence is the fact that the FCC has mandated that the Volunteer Examination Coordinators rearrange their question pools to include the topic of operating a ham radio from space. In other words, while most radio amateurs will never have the opportunity to operate from such a location as a space shuttle, the FCC wants all hams to know, understand and be tested on this aspect of amateur operations.

The FCC action to amend Section 97.207(a) was based on a petition filed in February by former West Gulf ARRL Director and Vice President Jim Haynie WB5JBP. *TNX Newsline; K6DUE; and Westlink Report #630, July 31, 1992.*

Ham Sat Teleconference

Amateur radio operators worldwide had the chance to learn a lot about ham radio satellites in general and the planned AMSAT Phase 3D in particular on Sunday, July 12th, when AMSAT-NA joined forces with the Amateur Radio Newsline and the Let's Talk Radio Network to present the 1992 Ham Satellite National Teleconference Radio Net. The two-hour interactive on-air session included such notables as AMSAT-NA President Bill Tynan W3XO; Executive Vice President Ray Soifer W2RS; Education Director Rich Ensign N8IWJ; Phase 3D Project Manager Dick Daniels W4PUJ; DL Amateur Radio Club (Germany) President Dr. Karl Minzer DJ0ZC; astronaut, explorer and educator Tony England W0ORE; and futurist writer Arthur C. Clarke, author of the epic science fiction novel *2001—A Space Odyssey*. Clarke is the man who actually outlined the concept of geostationary communications satellites almost five decades ago. Roy Neal K6DUE co-produced and hosted the NTRN, which originated live from a half-dozen cities across the nation. Bill Pasternak WA6ITF of Newsline was co-producer/director, with Mark Neal serving as associate director. This is the same team that was responsible for the critically acclaimed "Ham Radio in Space" video released by the ARRL and AMSAT-NA last fall.

Topics covered included the history of all communications satellites, the history of AMSAT and the OSCAR amateur satellites, and plans for Phase 3D and how it will be used by the general ham population and as an educational tool. Also touched on was the SAREX (Shuttle Amateur Radio EXperiment) operations, with listeners given a chance to hear "Tonight Show" host Jay Leno's monologue that was uplinked to the ham crew on STS-50 by ATV operators on the ham bands.

This NTRN probably had the widest audience of any in the decade-long history of these events. With John Desmond K0TG and Ann Marley at the helm, the Darome Connection Inc., a Minneapolis-based teleconferencing firm, once again made the NTRN available to repeaters nationwide that had asked for access. The Goddard Spaceflight Center Amateur Radio Club retransmitted the entire NTRN on virtually all of the high frequency amateur bands, while the people at Let's Talk Radio uplinked the session to GE Spacenet III, transponder 21, on its 6.2 MHz audio subcarrier.

Copies of the NTRN audio will be made available on cassette by AMSAT-NA to interested parties. For further information, contact AMSAT-NA, P.O. Box 27, Washington DC 20044.

Newsline is planning two more NTRNs before the end of 1992. In September, a session will be held to discuss the proposed changes to the "No Business Rule" Section 97.113 as outlined in FCC P.R. Docket 92-136, while December will bring a session on the All-Volunteer Testing System hosted by Steve Bauer KC0HF. *TNX Westlink Report #630, July 31, 1992.*

try something new

by Bill Brown WB8ELK

Hunting Down Parts

OK, let's say you've got this great idea for a Super Widget or you've just read an article about building one. Now where do you find all of the goodies to put it all together? If you can't find the parts at the local Radio Shack, do you just give up and look for another widget project?

Don't despair, there is a solution! This month I'll give you some ideas on where to find all of those hard-to-get parts and components.

Your Very Own Junque Box

First off, run down to your local discount store and pick up a couple of those storage bins that have the little sliding plastic drawers. Get one that has small drawers on the top few rows and one or two big drawers on the bottom level.

Use the small drawers for things like resistors, capacitors, transistors and miscellaneous small components. The large drawer is good for just about anything else.

In my workshop, I have several of these storage bins dedicated to just one type of component. I've got one for various resistor values, one for capacitors, etc.

Label each drawer with the component value—that way when you need a certain value resistor in a hurry you can immediately see if you have one. I usually have drawers for all the common values, whether I have it on hand or not. That way, if I find a grab bag of resistors at a flea market or at Radio Shack, I stock up for the moment when I absolutely need a particular value. It's a satisfying experience when I can hunt for a 1.2 megohm resistor at 2 a.m. and can actually find one in my resistor bin!

Pay a few visits to hamfests, flea markets or local surplus stores and stock up on various components until you have a stockpile.

Of course, it helps to take the time to actually organize your finds after the hunting expedition. I have to admit that I quite often end up with a pile of resistors on my workbench and have to rifle through them whenever I need a particular value (the archaeology method: I dig down 'til I find it).

Even for those of us with a massive junk box, there comes a time when we can't find everything that we need for a project. I usually get what I can from the local electronics store and then head into the world of mail order shopping.

Mail Order

There are countless companies out there that deal exclusively with electronics components. They are more than happy to cheerfully accept your order (usually you dial a toll-free number) and deliver the necessary goodies right to your door! You may have to wait a couple of days for the stuff to arrive in the mail, but it sure beats driving all over town in a hopeless search for one special component. Most of these companies pride themselves in filling and shipping an order as quickly as possible (most in just one day or less); they will even send it out next day delivery if you just can't wait (of course, they'll hit you up for the extra delivery charge). I've ordered some components and actually had them on my doorstep the very next day.

Some of these companies specialize in one type of component (i.e. connectors); others try to stock a wide array of parts. They usually have a minimum order, but I usually buy more than this amount. If I don't have enough to meet the minimum I just ask a friend or two if they want to order any parts, then combine our orders.

Some of the less common specialty devices are not carried by general mail order companies. They are usually carried by large phone order companies. The minimum order is quite often much higher (sometimes ridiculously high) as they tend to cater to large industrial

Continued on page 30

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upgrade . . . don't stop now

by Gordon West WB6NOA

Educational Counters

You can upgrade your radio wave understanding skills with an inexpensive frequency counter. Not only will a frequency counter read out a frequency that is being transmitted from a nearby handheld, but it will also illustrate quite clearly the relationship of transmitter power and its decrease as the square of the distance.

Several hot little portable frequency counters are available for under $99. These inexpensive precision counters feature a bright LED display that will read out in MHz or kHz. Their readout is so exact that you can even see the effects of a few hundred cycles warm-up change when you start using your handheld for the first time on a cold morning! And counters do a lot more than just read out the frequency of a nearby transmitter.

I use my counter as a quick indication of whether or not a two-way radio is indeed putting out power. Hand-held transceivers might be "counted" as far away as 30 feet on low power. On high power, you might even read a hand-held transceiver up to 60 feet away! But if you hold your counter right next to a handheld transceiver that you suspect is bad, and see absolutely no indication of a frequency when you transmit, indeed something's wrong.

WARNING: NEVER HOOK A FREQUENCY COUNTER UP DIRECTLY TO A TRANSMITTER. You only need to get close to the transmitting antenna to read it out. You don't need to touch the antenna with a counter. If the antenna is located high atop a transmitting tower, a counter will many times pick up the transmitter frequency by holding it next to the transmitter chassis down below.

Is your little cordless telephone working okay? If the counter can read its output more than six inches (that's right, only inches) away, everything is fine. However, if your little cordless phone can't get your counter counting, chances are its output is abnormally low. Cordless telephones and garage door openers have the least amount of power that an affordable counter might read up close. Real close—sometimes within an inch in order to be able to pick up these flea-powered signals. This gives you an appreciation of signal strength and the decrease of power with the square of the distance.

The portable frequency counter is a fun snoop-tool. If you get in close enough to a mobile or portable two-way radio transmission, you will be able to see their transmitting frequency. Do it in the counter's MHz mode for a nice fast readout. If your counter has a "hold" button, get your finger on it—the frequency counter will only read out a frequency for as long as it is actually on the air. Unless you have a hold button, the counter will read back to "000.000" when the transmission ceases. When I'm out snooping, I use a counter with a built-in beep and hold button. When the counter goes beep, I push the hold button, walk away from the transmitting source, and then take a glance and see where they were on the air.

Checking for your hand-held receiver's "desensitization" is a fun way to learn more about close-in, strong-signal problems. If your handheld cuts in and out for the reception of a distant repeater, there may be someone close by transmitting on an adjacent frequency, creating desensitization of your receiver section. Take the antenna off of your transceiver and put it on your counter's antenna circuit. Take a look and see what is on the air nearby. If it is strong enough to register on your counter it may be strong enough to create receiver blocking.

I once had a problem of a nearby transmitter creating static on my 145.8 MHz satellite downlink frequency. When the nearby signal came on, my satellite reception went off. I disconnected the antenna lead-in from my transceiver and plugged it into my counter. Twenty seconds later, the frequency 151.955 popped up. I put my programmable scanner on this frequency and traced it to my next door neighbor who comes home for lunch and stays in touch with his office on a 100-watt mobile unit in his pickup truck. Identifying the source of the interference lead to a speedy resolution of the problem.

When your little counter is on an outside antenna, you'll see the numbers flashing randomly on the screen. This is normal. It's picking up thousands of distant transmissions all at once, and all you get are random numbers. But as soon as a transmission goes on the air within 100 feet of your counter, it will instantly lock on and display the frequency. You can even count out the frequency of little low-power baby monitors, too, within 25 feet of your portable counter.

If you plan to use your counter outdoors, you'll need to read the LED display in the shade, or maybe spend some additional money for a counter with an LCD screen. But make that your second investment—start off with an inexpensive, under-$100 counter, and upgrade your skills about all those radio frequencies that surround us. You'll be surprised what's on the air within 100 feet!

Photo A. This portable counter shows a strong signal strength on the ham 2 meter band.

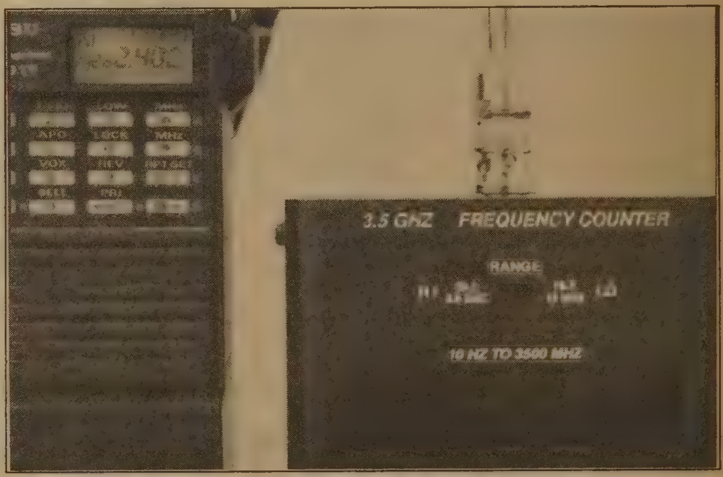

Photo B. Reading out a 1.2 GHz signal with a portable counter.

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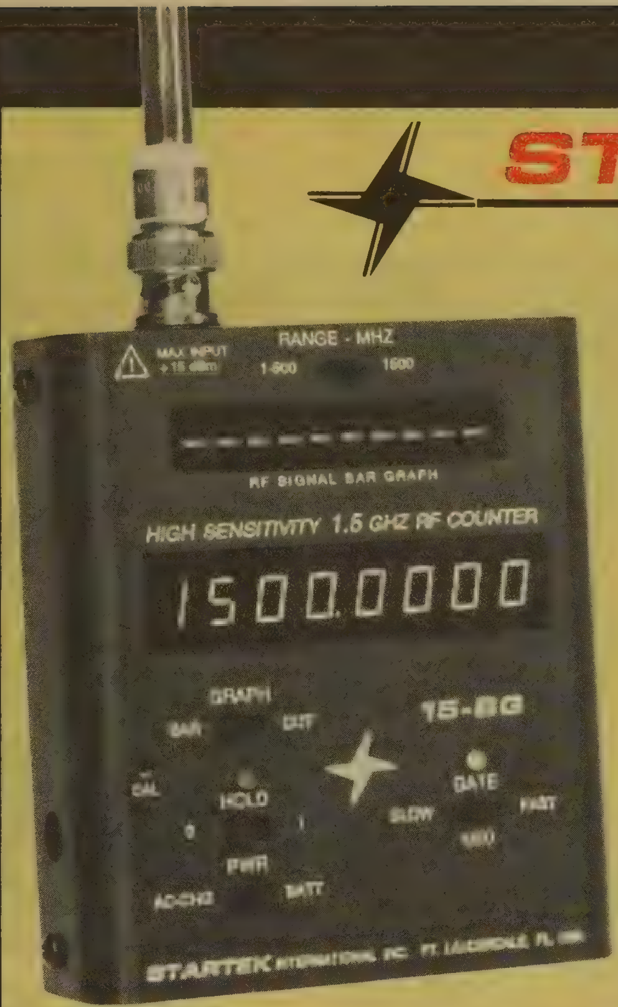

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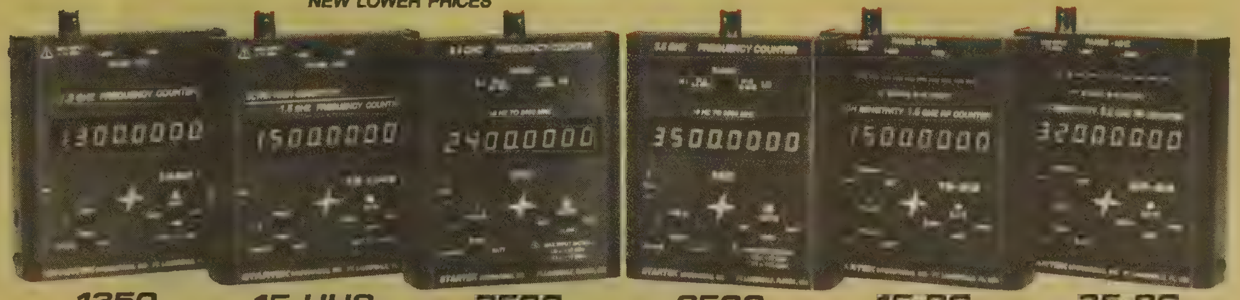

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CIRCLE 247 ON READER SERVICE CARD

Super Radio of Arecibo

by Roald Steen AJ0N/LA6US

The Arecibo Observatory on Puerto Rico is the world's largest radio telescope. Its antenna reflector has a diameter of 1,000 feet.

The Arecibo Observatory was built in the 1960s to study the ionosphere and other parts of the upper atmosphere with a radar technique which had just been developed. The ionosphere is the part of the upper atmosphere which is the most important for radio propagation but is difficult to study because it is too high for airplanes and balloons, and satellites encounter too much air resistance. A very large antenna and a very powerful radar transmitter were needed for this. It was soon realized that the Arecibo Observatory could also serve as an excellent radio observatory to study the universe at radio wavelengths.

The techniques for studying the upper atmosphere which the Arecibo Observatory pioneered were developed by Professor Gordon of Cornell University, who also managed the construction of the Observatory. For this reason, the Arecibo Observatory is managed by the National Astronomy and Ionosphere Center, which is a part of Cornell University in Ithaca, New York. Since the radar technology for studying the upper atmosphere was developed at the Arecibo Observatory, a number of newer observatories that study the upper atmosphere in this way have been built around the world.

Architectural and Engineering Details

The pleasant climate of Puerto Rico has given this island a cover of lush vegetation. The architecture of Puerto Rico, with its Spanish influence, has resulted in many remarkable buildings. Yet, the Arecibo Observatory has become one of the landmarks of the island.

The Observatory is a unique engineering achievement. Its 1,000-foot reflecting antenna is composed of almost 40,000 aluminum panels that can be adjusted to form an almost perfect section of a sphere. The aluminum panels are perforated so that rainwater and some of the sunlight can reach the ground below the reflector. This allows vegetation to grow there. This vegetation prevents erosion of the landscape underneath the reflecting disc.

Photo B. This platform is suspended 450 feet above the reflecting antenna in Arecibo.

Photo A. Arecibo Observatory is part of the National Astronomy and Ionosphere Center, operated by Cornell University under a contract with the National Science Foundation.

Photo C. The main feature of the Arecibo Observatory on Puerto Rico is its reflecting dish, which has a diameter of 1000 feet. It has become one of the most prominent landmarks on the island of Puerto Rico.

A triangular platform made from a grid of steel bars is suspended about 450 feet above the reflecting antenna. This platform supports the radio astronomy receivers which receive the weak signals from space. The receivers transform these signals into information that is analyzed by computers in the control building of the observatory.

The platform and the reflecting antenna must remain very stable under changing wind and weather conditions. Stability was therefore an important goal during construction.

The location was selected partly because of the surrounding limestone hills, which shield the observatory against man-made radio noise. This southern location also allows the observatory to study a very large part of the sky as the earth rotates.

Research Studies

An important research program at the Arecibo Observatory consists of studying the distribution of matter in remote galaxies and groups of galaxies. The rotational speed of a galaxy can be measured from here and from other radio observatories.

The speed with which a galaxy rotates depends upon its mass. It appears as if most galaxies contain considerably more mass than the amount that is indicated from the visible light from each. To determine what all the invisible mass in

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by Roald Steen AJ0N/LA6US

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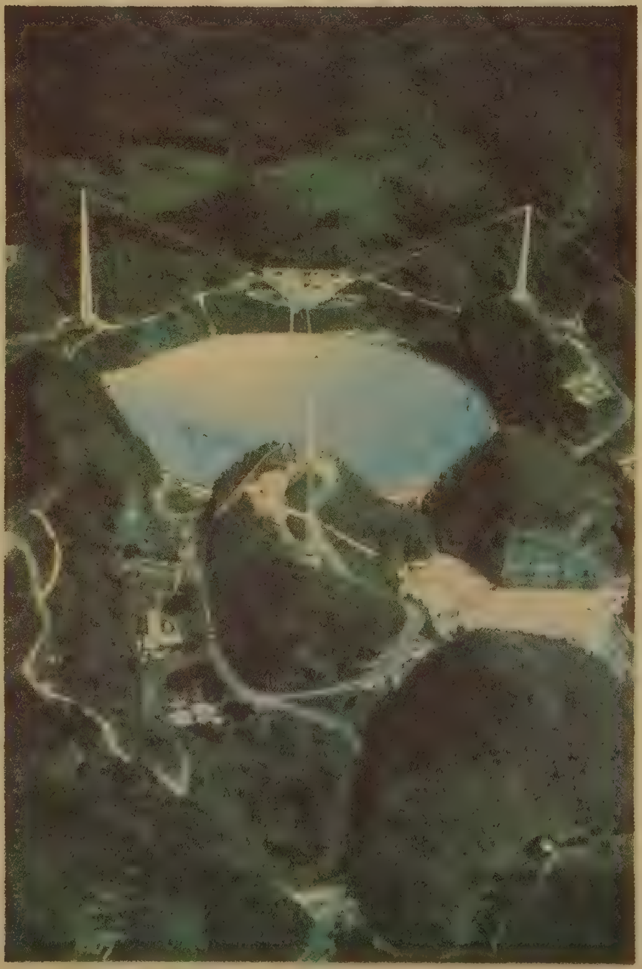

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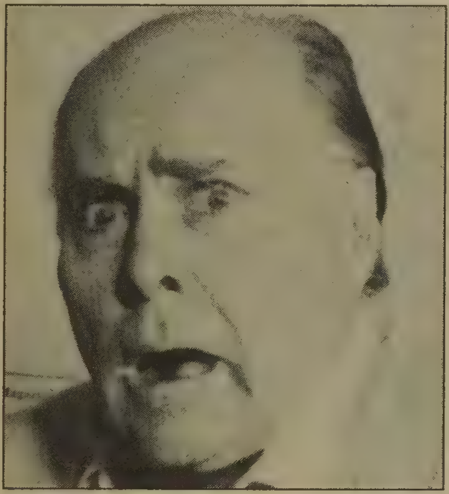

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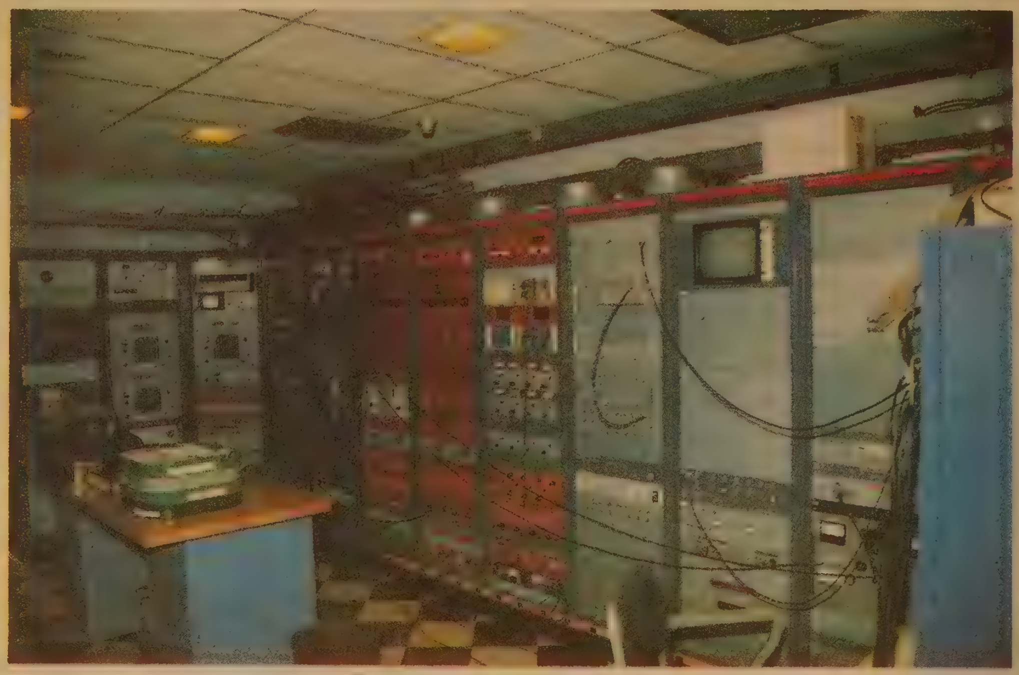


Photo D. These computers analyze the information which is received from the receiving equipment in the platform above the reflecting dish. New computers will be installed as part of the upgrading of the observatory which has recently been approved by the U.S. Congress.

Super Radio of Arecibo

Continued from page 16

a galaxy is composed of is one of the problems of modern astronomy.

Pulsars are very compact objects that rotate at high speeds. The rotating magnetic poles of a pulsar emit radio waves that look like pulses to an earth-based radio telescope. The Arecibo Observatory has devoted much observing time to these objects, which most astronomers believe are the remnants of supernovas.

Quasars are very remote objects that are very powerful emitters of radio waves and light waves. The first quasars were detected through a British radio telescope. Following this British discovery, the Arecibo Observatory has detected numerous quasars for the first time. Quasars are believed to be located near the center of very remote galaxies.

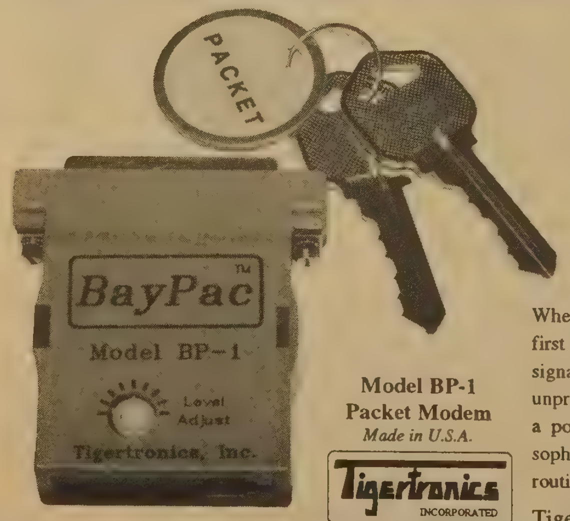
The Arecibo Observatory is used for another type of astronomical research, called radar astronomy. In radar astronomy, man-made radio signals are bounced off nearby planets, their moons, and other objects in the solar system. Fairly accurate maps of the surface of Venus, which cannot be seen because of this planet's cloud cover, were first produced through radar observations from the Arecibo Observatory.

The U.S. Congress has recently approved funding for a reconstruction of the Arecibo Observatory. The huge reflecting antenna, the platform, and the radio astronomy receivers will be improved to make the observatory even more sensitive to weak radio emissions from the stars. Another objective of the reconstruction program is to make the entire structure more stable.

The Arecibo Observatory will also receive new computers as part of the reconstruction. Computers are an important part of a modern radio observatory. The computers transform the raw data from the receiving equipment into radio images, where different intensities may be indicated by different colors, or into graphs and statistics.

The Arecibo Observatory often participates in observations in cooperation with other radio observatories. The observations at each observatory are recorded on magnetic tape, then these magnetic tapes are compared by a computerized system. It is possible to obtain much more detailed images of remote galaxies and other objects when the observations from two or more radio telescopes are combined.

A number of new and advanced astronomical observatories are under construction. New satellite observatories, including the Hubble Space Telescope, are in orbit. However, the almost-30-year-old Arecibo Observatory continues to produce important results of research on space and remote galaxies. And, its studies of the upper atmosphere continue to benefit radio amateurs and professional users of shortwave radio communications. RF



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CIRCLE 269 ON READER SERVICE CARD

computers in the shack

by Jeffrey Sloman N1EWO

Reading the Mail

I've been receiving lots of cards and letters here, and it's about time I passed some questions and advice from them on to you. I'd like to start out by saying that I really enjoy getting correspondence from you. It is always interesting to open a letter and see some new name and call, and some new idea. If you haven't written in the past, please do when you get a chance. If you've already written, thank you—and write some more. I read every letter you send, though I will make the usual disclaimer that I can't answer them all.

You can also reach me at CompuServe (71221,1143) or BIX (jsloman) where I moderate the ham.radio conference. One more note before we get started this month. Though I am happy to receive personal packet mail from anyone who sends it (N1EWO @ N5AAA.IN.USA.NA), I can't answer any questions about the column there, or use any of those messages here. That would be doing business, which we all know is not allowed. To those of you who have sent packet messages to me—thanks, I always like to get mail. You can also send me messages if you are trying to learn to use the PBBS software—as a test; I'm happy to be your guinea pig.

The Mailbox

Let's start with a letter from Bill Tourville N2ONE of Dewitt, New York. Bill writes that he just received his Technician class license (congratulations), and intends to interface his AT compatible computer and Realistic HT soon for packet. But, being a good son, Bill's asks his question to try to help his dad, N4CFN, in Florida. Bill says that his father has all the parts for a packet station—radio, computer, and license—except for the TNC. The problem is that the computer is an older machine, an Atari 800, and though serial port hardware is available for it, Bill was hoping to find a TNC that will plug into the machine's proprietary peripheral bus.

Well, Bill, I did some research but came up blank—so I am passing your question on to the readers of the column. Does anyone out there know where Bill's dad might find an Atari-compatible TNC? I hope so, and if you do know, let me know care of *Radio Fun*, or on CIS or BIX. That information will get passed on.

Dennis Moreston (WD0ETH@ KE0WO.#NWIA.IA.USA.NA), of Cherokee, Iowa, sent an information-packed letter. Denny says that he enjoys reading *Radio Fun*, and plans to subscribe (something we always like to hear!). Denny has been involved in packet for two years and says, "I noticed you mentioned that just about any cable would work between the TNC and computer. My experience with my own shielded cable, compared to friend's unshielded, is that the shielding reduced problems with RF getting into the TNC. I wonder if you have done any research on this, and what your opinion is at this time?" Well, Denny, you bring up an interesting point, and a chance for me to blather on a bit about some fundamental practical electronics.

To start, your point is well taken; sometimes you will need protection against induced RFI (Radio Frequency Interference), and shielded cable may be just the ticket. The shielded cable works the other way too. That is, it reduces radiation of any RF signal the TNC or computer might produce (with some equipment, this is worse than the first problem). To directly answer your question—yes, I have done some research on this area, and do have an opinion. First, the reason that I recommended something like phone wire is mostly because it is readily available, and will work in the majority of installations with no problem. This does not mean that a properly shielded cable is not a better idea, but the thought of a first-time cable maker trying to work with the braid made me hesitant to suggest it. I was hoping to lead them down the primrose path by making it easy at first, then letting them suffer like the rest of us! Seriously, though, the mechanical problems of freeing the conductors from the center of a good braid are hard to describe in print.

Now, on to research and opinion. In one of my past lives—in Boston—I designed and built recording studios. As you might imagine, one of the design goals of a music recording studio is a minimum of induced noise. Noise is induced into a cable because the cable acts as an antenna. The unwanted signal is added to the desired signal, and the results are not pretty. In the case of RF, this is a special problem as the length of the cable approaches a resonant frequency for a nearby transmitter. For example, a quarter-wave antenna on 2m is 19" long. It would be a very good idea to avoid 19" cables—shielded or otherwise—in a packet station.

The shield (or, for our British friends, the screen) of a cable prevents the induced signal from getting into the desired signal by "absorbing" the unwanted signal. This signal has to go somewhere and, since electricity always follows the path of least resistance, if the shield looks easier to the noise, it goes there. To this end the shield is connected to ground, preferably an earth ground where possible. This scheme works well for induced noise, but may present its own problems.

If two pieces of equipment are connected to each other via a shielded cable, and there is electrical potential (measurable current) between what each considers "ground," the shield will carry this current to the device whose "ground" looks like a lower voltage. This is called a ground loop. It is really only a problem with AC powered equipment, generally speaking, but can be a real one. How do we fix this? It is really simple, but may seem counter-intuitive—I am not making this up.

The proper grounding and shielding of equipment follows two simple rules:

1. All equipment should have its grounding connection to a single, central point—called a star ground because the coming from it form a multi-pointed star. This ground should be connected to an earth ground, if possible.
2. Shielded cables should have the shield connected to the output device's ground only, and not connected to the other end. In other words, shields get connected to only one piece of equipment, never two. Which is the output device is sometimes unclear. For example, in the case of the serial cable which started this discussion, both sides send and receive. In this case, choose the side with the better ground—the desktop computer versus portable TNC, for example. NOTE: THIS RULE DOES NOT APPLY TO ANTENNAS, WHICH ARE A SPECIAL CASE. A FEEDLINE'S SHIELD IS ALWAYS CONNECTED AT BOTH ENDS!

You might look at Rule 2 and think, "But if I connect the shield to only one side, how is the signal going to get through?" It won't—get through the shield, that is. If the cable normally uses the ground for a signal path—like in the one conductor with shield cables usually found on stereos—the star ground that was made in Rule 1 will take care of that. The point of this arrangement is to reduce or completely eliminate induced noise.

Now let's look at a purely practical application of this information and see how it applies to the original question. In the case of a serial cable, all of the above means that you should connect the shield to pin 1 (case ground) on one side of the cable—probably the computer. There is another ground, pin 7 (signal ground), that should carry the signal. In other words, never connect the shield to pin 7 and use it for a signal path, and never connect pin 1 on both sides of a serial cable. If you take this approach, you will get good results.

Also in the Mail

One of the station essentials often overlooked is a current copy of Part 97, the rules and regulations that govern our hobby. One of the nicer ways to get this information appeared in my mailbox the other day. A company called Thomas Software sent a copy of Part 97 on a diskette in the form of a nice little piece of shareware. FCCRULES contains all of Part 97 and a built-in viewer which includes keyboard navigation, as well as mouse support. A search feature makes finding what you need easy. The shareware registration fee is only $14.95. I highly recommend it for those of you with PC compatibles. You can get a version to try from the 73 BBS (603-924-9343, 1200 or 2400 baud, 8 data bits, 1 stop bit, no parity.) You'll find it in File Area 1 as FCCRULES1.EXE, a self-extracting archive.

Wrapping Up

As I write this column, disaster relief operations are under way in Florida to assist the victims of Hurricane Andrew. Current reports are sketchy, with not much communication into or out of the area. One thing, though, is very clear—ham radio is playing a very important role in the operation. Those of you new to amateur radio may not yet have had a chance to help your neighbors through ham radio. When the time comes, why not be ready to help? As a reader of this column, you are especially important—packet radio is probably the single most under-utilized resource in amateur radio. Seek out your local disaster relief agencies and see how you can help. Your enthusiasm, knowledge, and hard work are more important to your community than you might think. As always, thanks for taking the time to read and write. 73 de N1EWO. RF

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what next?

by Carole Perry WB2MGP

Bob Heil—Renaissance Man

Talk about having fun with your hobby . . . Bob Heil K9EID is definitely the man who does just that! In the eight years that I've had the pleasure of knowing Bob, I've never stopped being impressed at his diverse abilities and interests, and at his capacity for having fun with all his endeavors.

Bob is satellite equipment Dealer of the Year, a musician, a radio talk show host, an electronics consultant, a producer of TV shows, an author, an electronic equipment manufacturer, a popular speaker, and the Dayton 1982 Ham of the Year. With all this going for him, Bob has always said that he owes it all to ham radio. He is quick to point out that it was his background in ham radio that opened doors for him in many different areas, and his ability to repair electronic equipment that brought about a pivotal point in his career.

When he was 16 years old he began playing the Wurlitzer pipe organ at the Fox Theater in St. Louis. He became the protege of Stan Kann, a great organist and TV personality. In 1955 Kan called Bob's principal at Marissa High School to get permission for him to leave school to pursue his music.

The year he started working with Kann, Bob Heil was also learning his way around a radio station engineering booth with the late Larry Burroughs KØDGE, who was to become his first ham mentor. Burroughs was the chief engineer at KMOX Radio, and met Bob on the ham radio. Bob, 15 years old at the time, didn't know then that this chance meeting on the air would change his life. "Almost every day I think about what that guy taught me," says Bob. "He was my college education," Heil says appreciatively. To this day, Bob regrets he didn't pursue his formal education a little more. "If I had a formal degree in electrical engineering, lord knows where I would have been."

Once Bob received his Technician license he put up a big J-beam English antenna with 128 elements for 2 meters. He was also playing the organ regularly at this time at the Holiday Inn in St. Louis, where many of the Mercury 7 astronauts were training at McDonnell Douglas. Alan Shepherd had a pipe organ in his background and began talking with Bob about music, ham radio, and the big VHF antenna. They wound up working moonbounce with it to Europe as part of a Mercury Project training exercise.

As the years went by, Bob discovered that his ham radio background was helpful to him in repairing amplifiers at the little music store he had set up. The word soon spread and regional rock 'n' roll bands came from all over to the little shop in Marissa to get their amplifiers fixed. In 1969 the Grateful Dead came to St. Louis and found they had serious problems with their sound equipment so they hired Bob to fix and improve their electronic equipment. Next, the Who called on Bob. Bob Heil soon found himself becoming involved with the sound equipment of some of the most notable groups and entertainers in the music industry.

As Bob modestly says, "I learned my trade pretty well. A lot of the sound equipment that's out there today for rock concerts is because of what happened in Marissa." Heil was inspired by Quasar modular television, and assembled a number of large amplifiers and designed them in color-coded related patterns which could easily be plugged together into a unified fit.

For rock guitarists, Heil designed a "talk box" device. He used a surgical hose that goes from the talk box and plugs into the guitar. "It sounds like the guitar is talking. Peter Frampton was the best at it," says Bob. Heil Sound Ltd. traveled the rock circuit from 1969 through 1980, when Bob closed down that part of the business.

Bob Heil K9EID.

Bob Heil says that "'No' is not in my vocabulary. People would tell me, 'It's right here in this book; you can't do that.' 'Why can't you?' I'd say. I'm stupid and don't know any better about why things can't be done. So I do them." That is the philosophy that carried Bob through a myriad of fascinating careers.

The Home Theater

What's Bob up to these days? If he has his way, he'll soon be known as the man behind the must-have of tomorrow: the home theater.

In a warehouse outside Heil's office is his latest passion—The Roxy. The Roxy—officially called the "Home Theater TV"—is an actual mini-theater with 12 red cushioned seats stacked in three rows. It has crimson curtained walls and ceiling valances trimmed in gold and black. Hooded house lights hang from the valances.

At its core is a Zenith projection television operated by computer, which projects a 500-line, improved definition TV image on a 100-inch Da-Lite screen. The five-channel Dolby Pro Logic sound system has 16-inch speakers in a box on the floor. "They're killers," he says, "100 watt subwoofers, installed under the seats, that'll rattle your bottom. An explosion on the screen rattles the floor. It's better than the movies!"

Also worthy of noting is the remote control hand-held device that controls everything: adjusting the picture, selecting channels, dimming lights and operating the curtains.

Bob believes that most people will want to have their own Home Theaters. A truly fabulous evening of home video could cost as much as $250,000, but the budget version could be had for as little as $10,000. He's also working on a compact home unit that, he says, would cost a little over $5,000.

The Home Theater TV Inc. company hired Bob Heil as a design consultant, technical advisor and teacher. They plan to have 100 outlets selling Home Theaters in the next 30 months.

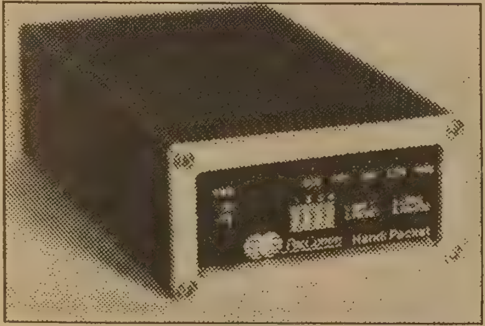
James the Butler

The newest device that is exciting Bob is "James the Butler." He makes this device through his Home Tech Co. in St. Louis.

James the Butler sounds like a really super device. If you don't talk to James within 20 seconds of entering the house, you know it will be quietly activating the phone and dialing the police. It can be programmed to call your mother. It has sensors and 16 timers for operating lights, heating and air conditioning.

Bob explains that it can sense when you walk into the room. It can be timed to turn the lights on and off, and open drapes. "It's a godsend for handicapped people," he says.

You can meet with Bob Heil in person at Dayton every year at Booth #106. There's always a large group of hams around to see the entertaining and educational demonstration Bob does at the Hamvention. Stop by and say "hello" to a creative ham radio operator who has learned the secret of combining a hobby that he truly loves with a career. Most successful people today will tell you that the single most important thing is to find something you enjoy doing, and then figure out a way to get paid for it. Just ask Bob Heil K9EID. RF



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Azden PCS-3000

Continued from page 6

ro to 25 watts.

Other stations reported excellent audio quality, without exception. Realizing that folks sometimes tend to be overly courteous, especially when they know you've just bought a new rig, I pressed the issue. I asked them specific questions, such as "Does it sound tinny or bassy? Is there any background noise or distortion on modulation peaks?" Still, nobody had anything bad to say.

Received audio quality was also superior. I connected my own external speaker up to the rig via the 1/8-inch phone plug on the rear of the main unit. I haven't heard a better FM rig.

My PCS-3000 uses 5 amperes in high power. My supply delivers 6 amperes, so this is no problem. A couple of lantern batteries in series probably won't do it, though.

I also conducted tests for microphonics. While talking to a friend, I literally pounded on the radio and dropped it from a height of a few inches onto the table (which was protected by a placemat!). In both receive and transmit, there was no detectable noise on the signal, except for the noise in transmit that was picked up by the microphone ("What are you doing to that radio, man?").

Mobile Operation

You'd better get acquainted with the microcomputer before you go out and try to operate this radio while driving. Once you're familiar with it, it's easy and convenient to use; it'll almost operate itself.

Here in Miami, the interior of an automobile can rise to formidable temperatures even in the winter. Would this have any effect on the audio quality? Tests with other stations indicated it didn't, other than to produce intermittent gasps and a rather sleepy sound on the part of the operator.

I made a special point to inquire about alternator whine or ignition noise on the transmitted signal. I've never had any trouble of this kind in the past with previous rigs, so I guess my car is pretty quiet in that respect. There wasn't any of this kind of problem with my PCS-3000. Other stations reported the same excellent audio quality in mobile operation as in fixed operation. What about background-noise pickup? Well, going 55 mph into a stiff breeze with all the windows rolled down and a semi truck passing me, I have to confess that other stations noticed quite a bit of background noise. But I was still "solid copy."

The digital S-meter, consisting of five red bar-type LEDs, is very sensitive. A full-quieting signal always lights all five of them. If a signal is so weak that none of them is lighted, it's almost unreadable. (Incidentally, even the weakest of weak signals will stop the scan.) The meter reacts very rapidly to changes in signal strength such as "picket fencing." No mechanical meter could possibly follow this.

In an unfamiliar area, the programmable band-scan feature is very convenient. You may want to scan the entire 2 meter FM band, but it is useless to waste scanning time covering a bunch of frequencies you know won't have any FM signals. I program 145.11, the lowest repeater output frequency in the United States, into memory 7 and 147.39, the highest, into memory 8, before going on long trips. The PCS-3000 scans about five channels per second, which is roughly 25 kHz per second using 5 kHz increments and 50 kHz per second using 10 kHz increments. To cover the above range, the scanner takes one minute and 29 seconds in 5 kHz steps and 44 seconds in 10 kHz steps.

Interesting Quirks

One thing that I discovered, after several hours of operation, is that this radio actually has a hidden memory channel. What's more, it is instantly available at any time, just like the priority channel, memory 1. The PCS-3000 remembers the frequency you're on just before you go into memory mode. When you leave the memory mode, you're back on that frequency.

I usually set my rig to 146.52 before I go into memory mode, so that I can instantly go back to this important simplex frequency. Usually, I have 146.52 programmed into memory 7 as the lower limit of the band scan and don't want to duplicate it in memory 1.

If you program the band-scan limits in backwards—that is, the upper limit in memory 7 and the lower limit in memory 8—the scanner won't work. In this case, as soon as you hit BAND SCAN, the microcomputer will go to memory channel 7 and stay there, blinking just a bit as it scans that one channel over and over!

The "channel lock" switch, located

Continued on page 23

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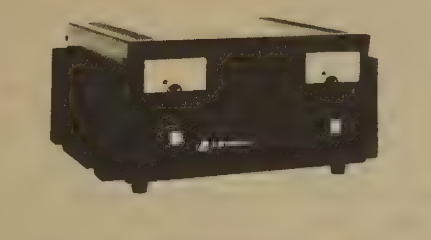

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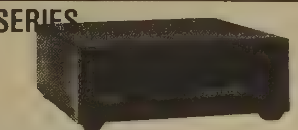
SPECIAL FEATURES

- SOLID STATE ELECTRONICALLY REGULATED
- FOLD-BACK CURRENT LIMITING Protects Power Supply from excessive current & continuous shorted output
- CROWBAR OVER VOLTAGE PROTECTION on all Models except RS-3A, RS-4A, RS-5A, RS-4L, RS-5L
- MAINTAIN REGULATION & LOW RIPPLE at low line input Voltage
- HEAVY DUTY HEAT SINK • CHASSIS MOUNT FUSE
- THREE CONDUCTOR POWER CORD except for RS-3A
- ONE YEAR WARRANTY • MADE IN U.S.A.

PERFORMANCE SPECIFICATIONS

- INPUT VOLTAGE: 105-125 VAC
- OUTPUT VOLTAGE: 13.8 VDC ± 0.05 volts (Internally Adjustable: 11-15 VDC)
- RIPPLE Less than 5mv peak to peak (full load & low line)
- All units available in 220 VAC input voltage (except for SL-11A)

SL SERIES



• LOW PROFILE POWER SUPPLY

MODEL	Colors Gray	Colors Black	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
SL-11A	•	•	7	11	2¾ x 7⅝ x 9¾	11

RS-L SERIES

• POWER SUPPLIES WITH BUILT IN CIGARETTE LIGHTER RECEPTACLE

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
RS-4L	3	4	3½ x 6⅛ x 7¼	6
RS-5L	4	5	3½ x 6⅛ x 7¼	7

RM SERIES MODEL RM-35M

• 19" RACK MOUNT POWER SUPPLIES

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
RM-12A	9	12	5¼ × 19 × 8¼	16
RM-35A	25	35	5¼ × 19 × 12½	38
RM-50A	37	50	5¼ × 19 × 12½	50
RM-60A	50	55	7 × 19 × 12½	60
• Separate Volt and Amp Meters				
RM-12M	9	12	5¼ × 19 × 8¼	16
RM-35M	25	35	5¼ × 19 × 12½	38
RM-50M	37	50	5¼ × 19 × 12½	50
RM-60M	50	55	7 × 19 × 12½	60

RS-A SERIES

MODEL RS-7A

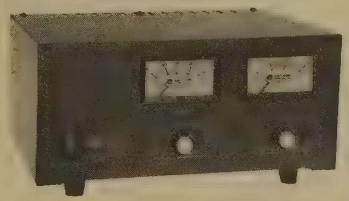
MODEL	Colors Gray	Colors Black	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
RS-3A		•	2.5	3	3 × 4¾ × 5¾	4
RS-4A	•	•	3	4	3¾ × 6½ × 9	5
RS-5A		•	4	5	3½ × 6⅛ × 7¼	7
RS-7A	•	•	5	7	3¾ × 6½ × 9	9
RS-7B	•	•	5	7	4 × 7½ × 10¾	10
RS-10A	•	•	7.5	10	4 × 7½ × 10¾	11
RS-12A	•	•	9	12	4½ × 8 × 9	13
RS-12B		•	9	12	4 × 7½ × 10¾	13
RS-20A	•	•	16	20	5 × 9 × 10½	18
RS-35A	•	•	25	35	5 × 11 × 11	27
RS-50A	•		37	50	6 × 13¾ × 11	46

RS-M SERIES

MODEL RS-35M

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
• Switchable volt and Amp meter				
RS-12M	9	12	4½ × 8 × 9	13
• Separate volt and Amp meters				
RS-20M	16	20	5 × 9 × 10½	18
RS-35M	25	35	5 × 11 × 11	27
RS-50M	37	50	6 × 13¾ × 11	46

VS-M AND VRM-M SERIES

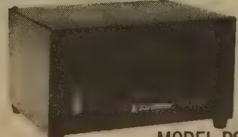


MODEL VS-35M

• Separate Volt and Amp Meters • Output Voltage adjustable from 2-15 volts • Current limit adjustable from 1.5 amps to Full Load

MODEL	Continuous Duty (Amps) @13.8VDC	@10VDC	@5VDC	ICS* (Amps) @13.8V	Size (IN) H × W × D	Shipping Wt. (lbs.)
VS-12M	9	5	2	12	4½ × 8 × 9	13
VS-20M	16	9	4	20	5 × 9 × 10½	20
VS-35M	25	15	7	35	5 × 11 × 11	29
VS-50M	37	22	10	50	6 × 13¾ × 11	46
• Variable rack mount power supplies						
VRM-35M	25	15	7	35	5¼ × 19 × 12½	38
VRM-50M	37	22	10	50	5¼ × 19 × 12½	50

RS-S SERIES



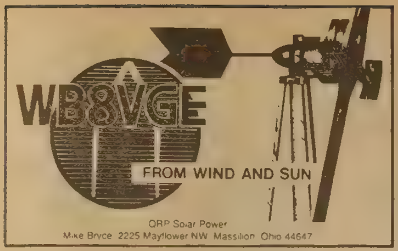
MODEL RS-12S

• Built in speaker

MODEL	Colors Gray	Colors Black	Continuous Duty (Amps)	ICS* Amps	Size (IN) H × W × D	Shipping Wt. (lbs.)
RS-7S	•	•	5	7	4 × 7½ × 10¾	10
RS-10S	•	•	7.5	10	4 × 7½ × 10¾	12
RS-12S	•	•	9	12	4½ × 8 × 9	13
RS-20S	•	•	16	20	5 × 9 × 10½	18

*ICS—Intermittent Communication Service (50% Duty Cycle 5min. on 5 min. off)

CIRCLE 16 ON READER SERVICE CARD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Getting Your Signal Out: Antennas

Getting your signal out from your back yard and into the other guy's receiver requires an antenna. It's not going to happen any other way unless you have some type of sky hook. Of course, not everyone has the real estate to put up a full-size 20 meter beam in the back yard. Plus, there are many places where ANY kind of antenna is strictly forbidden. But, getting on the air from there is still not impossible.

Dipole Antennas

Ask any Novice the formula for a half-wave dipole and you'll get an answer. It's 468 divided by the frequency in megahertz. So, a half-wave dipole for 40 meter CW is then 66 feet long. Now, divide that amount again and you'll come up with 33 feet on each side of the dipole. "Di" means two, so a dipole has two equal parts. The total length of a dipole is considered a half-wave antenna.

A dipole is simple and is usually the best antenna for a beginner to start with. It's easy to build and in most cases it will work. However, life can be unkind and throw a monkey wrench into your dipole design. Some antennas work great on particular installations, and then when you turn around and try to use it at your house it won't work worth a hoot! Antennas have kept many a ham busy tinkering and having fun, just playing with them. Why, some people consider antennas a hobby within a hobby.

Hams have a funny way of talking about antennas. We generally speak of wavelengths. A wavelength relates to the operating frequency. Remember, you don't have to have a half-wave dipole antenna! You can get on the air with an antenna shorter than a half wave.

What do you do if you don't have 66 feet to work with? You can add coils or "traps" to the antenna to make it electrically longer, but physically shorter. I'll discuss this in a later column. You'll need two supports at both ends of your dipole to keep it in the air.

Getting Your Antenna Up

Let's look at the first problem: getting the dipole up. Unless you have two friendly trees growing at exactly the right spots, you're going to have to come up with some other type of support for the dipole's ends. You can use poles, towers, and even other houses, if you ask! However, in many cases, you just don't have the support or the room to run a dipole horizontal. A very good choice then is to use the dipole as an inverted "Vee" configuration. This is also known as an "inverted dipole."

An inverted dipole requires only one support in the center. This can be a tower, tree, or even the top of the roof pitch. In my particular case, I use my tower. It's about 40-plus feet high. I've used my inverted dipole with great success on 40 meters.

If you support your antenna at only one end, you'll have what is known as a sloper. I have one installed on the 30 meter band (10.100-10.150 MHz). It works fine, but I don't have the one end up high enough to really make my sloper a good talker.

Build Your Own Dipole

I'm a firm believer that you should never buy a dipole. They're just too easy to build, and besides, it's great fun! You can get all the stuff you'll need to construct a dipole antenna from Radio Shack. Here's a shopping list for all the material you'll need to make a 40 meter dipole (either inverted or sloper). You'll need the following:

- One roll of antenna wire, #278-1329.
- Two antenna end insulators, #278-1335. They're two in a pack.
- One "dog-bone" insulator #278-1336, RG/8U coax cable #278-1312. The new and improved stuff—it's not too bad from the shack.
- Throw in some connector sealant, #278-1645.
- One "premium" PL-259, #278-188.

That's all you'll need in the way of material. For tools, you'll need a tape measure at least 75 feet long. A heavy-duty soldering iron or gun (if you're really good with one, a propane torch will do, BUT NOT FOR SOLDERING THE PL-259!!!) You'll also need some nylon cord to hold the ends up on the dipole.

You don't have to use the antenna wire I have listed. Any wire will do; just be sure it is strong enough to hold the weight of the coax and the wire itself. Yes, you can use insulated wire, but the added weight may be a problem. I've used electric fence wire with good results. It's not made of copper wire but steel. Soldering to it can be a real pain in the butt.

The dog-bone insulator will become our center of the dipole. Actually, you can use just about anything as long as it's a good insulator at RF frequencies and is built to withstand the weight of the wires and the coax. I've used just about anything I could get my hands on. I've used the plastic rings that hold a six-pack of Coke together. I've even used an old plastic hair curler! I'll have to admit it, these were for temporary antennas for Field Day use, but they did work.

If you can get a helper to help keep the wires from being tangled up, dipole building goes a lot easier.

Get your soldering iron hot—and you'll need a heavy-duty one. On one end of the dog-bone insulator, wrap the end of the pack of antenna wire around the hole and back on itself. Make sure you have it good and secure. Measure off about 34 feet or so of wire. The pack from Radio Shack comes in 70-foot lengths. Do the same to the other end. You should have two wires, one connected to each hole of the dog-bone insulator. Leave the other end free for the moment.

Take one end of the coax and strip about six inches of the black jacket off. Wind up the braid and solder-tin the end. Now, connect the braid to one wire (it does not make any difference which one), and the center to the remaining wire. Make a good mechanical connection. Solder the connections using lots of heat and solder—make the connections as though they have to last 30 years. Take some of the coax seal and tape the ends of the coax with the stuff. You don't want water to enter the coax.

You need to put on the PL-259 connector next. Check out the *ARRL Handbook* for a clear and detailed look at soldering these critters. If nothing else, don't forget to include the coupling ring before you start soldering the other end on the cable's end.

Antenna placement can be tricky. Before you hoist up wire number one, look over the location very carefully. Never, but never, run your antenna wire over or under any electrical power wires. If they were to contact your antenna you'd be electrocuted. If nothing else, your radio gear will become instant crispy critters!

Also, avoid metal objects such as down spouts, rain gutters, metal towers, and metal siding. The metal objects tend to distort the antenna's pattern.

On the other end of the wires, install the end insulators. Attach the nylon rope to the insulators. Now, depending on how you support your dipole, either inverted "Vee" or sloper fashion, pull the ends out from the center to avoid getting the wires twisted together. When working on inverted "Vee" or sloper dipoles, the higher off the ground you can get the ends the better the dipole will work. The same is true on a regular horizontal dipole, too.

Tuning

After you have the dipole up the fun part comes—tuning it to your operating frequency. Some of us prefer the low end of the band for CW (7.040) use, and then there are those who like the high end for SSB (7.200) use. You can of course tune the antenna for the middle of the band and let your antenna tuner tune out the SWR as you go from one end to the other.

To tune the antenna, you'll need an SWR meter and a transmitter. You can also use a noise bridge. If you have a noise bridge, then you'll know how to use it. A noise bridge is a tool you won't find in too many hams' tool boxes. Most of us use an SWR meter to adjust our antennas.

Tune your transmitter to the frequency you'll be operating on. Be sure the frequency is clear. Don't cause needless QRM on the bands. Now, for as short a time as you can, to avoid interference with others, apply RF to your dipole. Note the SWR. With a little bit of luck, the SWR should be fairly low. The dipole will resonate higher than normal because of the extra length (34 feet) of wire. This gives us something to prune. It's easier to cut the wire than to add to it. If this isn't the case, then we need to trim the antenna.

To find out if the antenna is resonant on the high end or the low end of the band, we need to apply some RF at those points (or again, use your noise bridge if you have one). If you find the SWR is low on the high end of the band, and you want to use the lower end, then you'll have to make the antenna longer. If the antenna is resonant on the low end and you want to use the higher end, then you'll need to shorten the antenna. To raise the resonant frequency of an antenna, you shorten the antenna. To lower the resonant frequency of an antenna, you lengthen the antenna.

Following these steps, you'll end up with a dipole that will really work great for you. Antenna building is a lot of fun. Give it a try. Next month we'll look at some ways to put an antenna up in places where you can't put an antenna up. RF

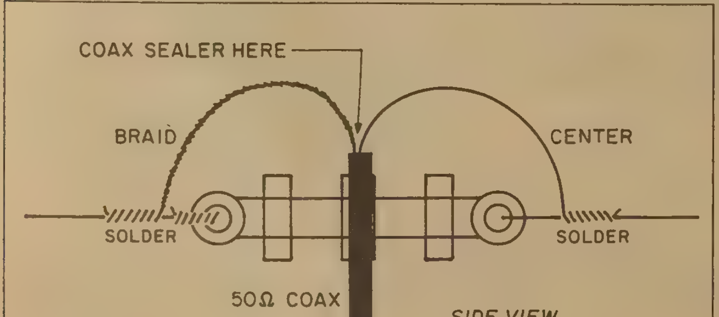

Figure 1. Attachment of the feedline to the center insulator of the antenna.

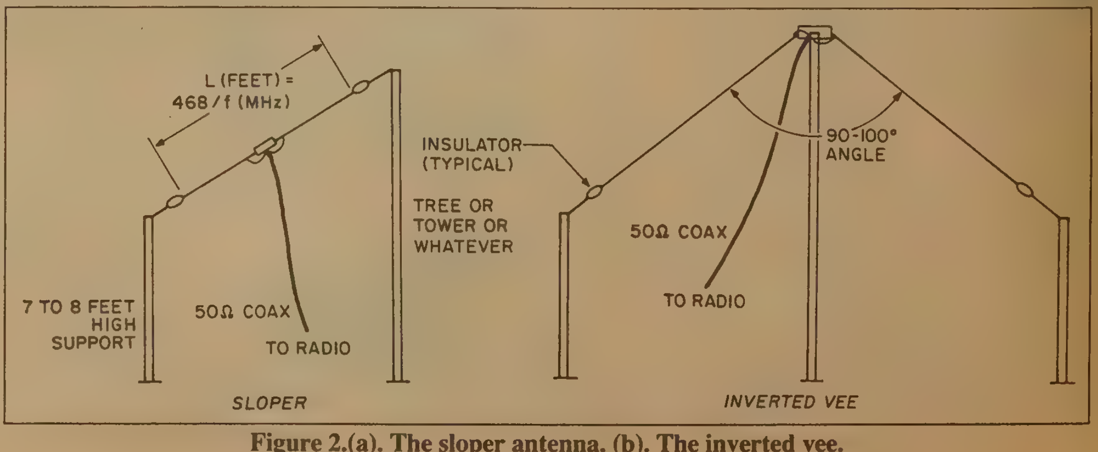

Figure 2.(a). The sloper antenna. (b). The inverted vee.

Continued from page 21

on the microphone and used for monitoring the repeater input frequency, operates by making the microcomputer think the radio is transmitting when it is actually receiving. Since the keyboard is disabled in transmit mode, the channel lock switch also has this effect. You can still transmit on the repeater input frequency when this switch is activated.

It's almost as if this microcomputer radio has its own personality traits. I already feel as if I "know" it!

Specifications

I was able to actually check only a few of the specs on my PCS-3000, and have marked those with an asterisk, in the list of vital statistics given in the literature—see the sidebar.

The introductory price for this rig (at the time of this writing) is $339 with the free Touch-Tone pad kit. All accessories such as power cord, fuse, microphone, and mobile mounting bracket/hardware are included. Optional accessories include an external speaker, extra DC cord and plug, extra mobile mounting bracket, 15-foot cable for remote-head operation, 6 amp AC power supply, and Touch-Tone microphone back kit. RF

Reprinted from the May 1981 issue of 73 Magazine for Radio Amateurs.

Azden PCS-3000 Specifications

General:	
Semiconductors	IC 18, FET 7, Tr 36, Di 61
Frequency band*	142,000—149.995 MHz
Ambient temp. range	-10 to +50 degrees C
Antenna impedance	50 ohms, resistive
Power supply	+13.8V +/-15% negative ground
Current consumption*	0.7A maximum (receive) 5.0A maximum (transmit)
Dimensions, overall*	H x W x D: 62 x 158 x 246 mm 2.4" x 6.2" x 9.7"
Dimensions, head only*	H x W x D: 62 x 158 x 65 mm 2.4" x 6.2" x 2.6"
Weight*	Approx. 2.5 kg 5.5 lbs.
Transmitter:	
Carrier output*	25 watts (high), 5 watts (low)
Emission type*	F3 by varactor modulation of VCO
Frequency deviation	+/- 5 kHz maximum
Spurious output	Down at least 60 dB from fundamental
Microphone	500 ohms, dynamic
PL tone frequency	67 to 250 Hz, adjustable
PL tone deviation	0 to +/-kHz, adjustable
Receiver:	
Receiving system	Double conversion superheterodyne First IF: 16.90 MHz Second IF: 455 kHz
Sensitivity	0.28 µV or better, 20 dB NQ 0.19 µV or better, 12 dB SINAD
Selectivity	+/-6 kHz or more at 6 dB down +/-15 kHz or less at 60 dB down
Audio Output	2 watts or more into 8 ohms, 10% THD
Accessories, Standard:	
Auxiliary offest provision*	Three available
Auxiliary offset, built-in*	Air Force MARS:—1.305 MHz CAP: -4.250 MHz
Dynamic microphone*	500 ohms
Built-in speaker*	8 ohms
Mobile mounting bracket and hardware*	
Accessories, Optional:	
Auxiliary offset crystals	Parallel resonant 20 pF, HC18-U holder
CS-ECK 15-foot remote cable	$35
CS-6R 6-amp AC supply	$59.95
CS-AS 8-ohm remote speaker	$18
CS-TTK Touch-Tone microphone kit	$39.95

*Specifications actually checked by the author.

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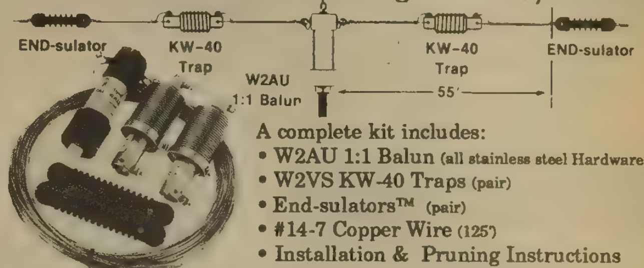

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- W2VS KW-40 Traps (pair)
- End-sulators™ (pair)
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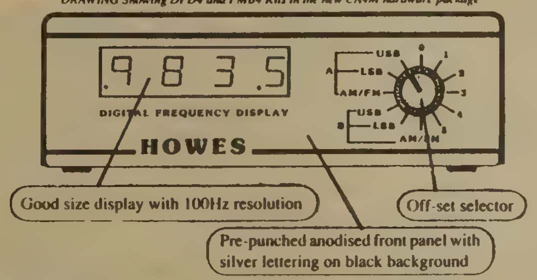
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To make the DFD4 even more suitable, we now offer the **PMB4** Programmable Matrix as an optional kit. This enables you to switch between six different programmed offsets, so the DFD4 can be used with more than one radio, and to compensate for IF frequency differences when switching modes. Also new is the **CA4M** "hardware package." This contains a custom made case with pre-punched anodized aluminum front panel (see drawing above), plus switch, knob, BNC socket, nuts and bolts, etc. to enable you to achieve a high standard of finish for your project.

DFD4 Kit	$71.95
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Ordered separately	$125.85
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activities calendar

Send your announcements to: Radio Fun Activities Calendar, 70 Route 202-N, Peterborough NH 03458. We'll print as many as space allows, on a "first come-first listed" basis.

OCT 3-4

BOXBORO, MA The 1992 New England ARRL Convention will be held at the Host Inn and Conference Center (formerly Sheraton), from 9 AM-5 PM Sat.; 10 AM-2 PM Sun. This Convention is being presented by ***The Federation of Eastern Massachusetts Amateur Radio Associations. Tel. (617) 631-7388***.

OCT 4

HUNTINGTON, IN The Huntington County ARS will sponsor its 4th annual Hamfest at the PAL (Police Athletic League) Club from 8 AM-3 PM. Set-up at 6 AM. Indoor Flea Market. Free Parking. VE Exams. Handicap accessible. Advance tickets $3.50, $4 at the door. 8' tables are $5 on a first-come first-served basis. Talk-in on 146.085/.685 and 448.975/443.975. For tickets and tables contact ***Ray Tackett KC9DZ, 420 Market St., Andrews IN 46702***.

OCT 9-10

AUGUSTA, GA The ARC of Augusta will sponsor a Hamfest at the Civic Center, 601 7th St., downtown, exit 46 on I-20 from 6 PM-9 PM Fri., and from 8 AM-5 PM Sat. Set-up 3 PM Fri., 6 AM Sat. Free parking. Handicap accessible. RV Parking. VE Exams: registration at 12 noon, testing at 1 PM; bring 2 forms of ID, Novice exam is free; upgrades bring original license, copy, and $5.40. Flea Market. Admission $4 in advance, $5 at the door. Children 12 and under free. Tables $10. Talk-in on 144.89/145.49. For tickets/tables, send SASE and check to ***Paul Murray N4XTD, Burden Lake Rd., Aiken SC 29803***.

OCT 10

BALDWINSVILLE, NY The Radio Amateurs of Greater Syracuse (RAGS) will hold its 37th Hamfest at the Tricounty Convention Center from 9 AM-4 PM. Flea Market set-up is 4-10 PM Fri., and 6:30-8:30 AM Sat. All indoors. Wheelchair accessible. Pre-register for VE Exams. There will be commercial vendors, computers, tech talks, contests. Restaurants, movie theaters and snack bars are all on the premises. Talk-in on 146.31/.91 MHz. For inquiries call ***(315) 469-0590***.

GRAND FORKS, ND The Forx ARC will hold their Hamfest in the Grand Forks Civic Auditorium, 615 1st Ave. North. Swapfest with tables provided. VE Exams. Forums. Admission $4. Talk-in on 146.34/.94. Contact ***Gerry Nies N0NGW, 1815 University Ave., Grand Forks ND 58203. Tel. (701) 775-5066***.

HUNTINGTON, WV W5YI testing sessions, sponsored by the Tri-State ARA, Inc. VE Team, will be held at Our Lady of Fatima church school class rooms, 545 Norway Ave., at 10 AM. Bring a photo ID, a copy of current licenses or original CSCE, and a completed Form 610. Form 610 will be available at the test session. No pre-registration necessary. Arrive by 9:15 AM to register, and to have ID and Form 610 checked prior to examination. For info call ***Jim Baker K8KVX, (304) 736-6542***.

KITSAP, WA The North Kitsap ARC will present their 1st annual Hamfest/Swapmeet, at the Kitsap County Fairgrounds, President's Hall (northwest corner of Fairgrounds and Nels Nelson Rds.) from 9 AM-4 PM. Admission $4 at the door. To reserve tables, contact ***Matt Amis AA7LP, 2196 California Ave. E., Port Orchard WA 98366. Tel. (206) 871-7099***.

TEANECK, NJ The Bergen ARA will hold its annual Fall Hamfest from 8 AM-2 PM at Fairleigh Dickinson University. From the east, follow Rte. 4 west to River Rd. exit. From the west, follow Rte. 4 west to River Rd. exit. Admission $2. XYL and harmonics free. Sellers $10 per parking space. Space with power $20 (preregistration required). For Hamfest info,—contact ***Jim Joyce K2ZO, (201) 664-6725***. Talk-in on 146.190/.790 and 145.620 simplex. For VE Exams info, call ***Pete Adely K2MHP, (201) 796-6622***. Please, no calls after 10 PM.

OCT 10-11

EL PASO, TX The International Hamfiesta will be held at the Texas National Guard Bldg., 9100 Gateway Blvd. North, on Sat. from 8 AM-5 PM, and Sun. 8 AM-3 PM. RV parking, no hookups. Admission $5 in advance, $6 at the door. Tables $5. Tailgate spaces $5. Seminars, QCWA Breakfast. VE Exams both days. Talk-in on 146.88 rptr. Contact ***Clay Emert K5TRW, Box 31628, El Paso TX 79931. Tel. (915) 859-5502***.

MEMPHIS, TN The Greater Memphis Amateur Radio and Computer Show, MemFest 92, sponsored by the Mid-South ARA, will be held at the Mid-South Fairgrounds in the Pipkin Bldg., Sat. 9 AM-4 PM, and Sun. 9 AM-2 PM. Admission $5 at the door. VE Exams Sat. and Sun. 9 AM-12 noon. Flea Market tables $20 per table for the weekend; contact ***Steve Cheeseman NX3W, 3290 New Getwell, Memphis TN 38118. Tel. (901) 365-6621 (W), (901) 368-6781 (H)***. Exhibitors contact ***Nita Woofford N4DON, 2966 Cordell, Memphis TN 38118. Tel. (901) 363-4971***. Talk-in on 146.28/.88 and 449.00/444.00.

OCT 11

WAUKESHA, WI The Kettle Moraine RAC Inc. will hold its 14th annual Ham/Computer Swapfest at the Waukesha County Exposition Center, Hwys J & FT. All indoors from 8 AM-1 PM. Advance tickets $4, $5 at the door. Reserved tables are $5 for each 4' length (admission ticket required). Reservation deadline is Oct. 3rd. Vendor set-up at 6 AM. The Badger Examiners will conduct Exams. For reservations, send a check payable to ***KMRA Swapfest, P.O. Box 411, Waukesha WI 53187-0411***. Please include an SASE. Waukesha County Airport is next door for fly-ins.

OCT 17

GRAY, TN The Appalachian Fair Grounds, off I-181, will be the location for the 12th annual Tri-Cities Hamfest, sponsored by the Kingsport, Bristol, and Johnson City Radio Clubs. Drive-in indoor and outdoor Flea Market space is available. RV hookups. Admission $5. Mail inquiries to ***Tri-Cities Hamfest, P.O. Box 3682 CRS, Johnson City TN 37602***.

SCOTCH PLAINS, NJ The Tri-County Radio Assn. will hold their TCRA Hamputer Fest, from 8 AM-2 PM, at the Union Catholic Regional High School (on Martine Rd.). Donation $4. Children under 12 admitted free (must be accompanied by a parent). For walk-in VE Exams, please arrive by 9:30 AM. Bring check for $5.40 made out to "ARRL VEC' for all except Novice exams. Also bring your original license and a Xerox copy; 2 forms of ID; pencils and a pen. Reservations required for: Tailgating $8; Tables $10 ($12 with power). Contact ***Dick Franklin W2EUF, 310 Indian Trail, Mountainside NJ 07092. Tel. (908) 654-4943***.

OCT 18

CAMBRIDGE, MA A Tailgate electronics, computer and amateur radio Flea Market will be held at Albany and Main Streets from 9 AM-2 PM by the MIT Electronics Research Society, the MIT Radio Society, and the Harvard Wireless Club. Free off-street parking. Tailgating. Admission $2. Sellers, $8 per space at the gate, $5 in advance (includes one admission). Set-up at 7 AM. For space reservations/info, call ***(617) 253-3776***. Mail advance reservations before Oct. 5th to ***W1GSL, P.O. Box 82 MIT BR., Cambridge MA 02139***. Talk-in on 146.52 and 449.725/ 444.725-pl 2A—W1XM rptr.

CENTRALIA, IL The Centralia Wireless Assn., Inc., will hold its annual Hamfest at the Kaskaskia College Gymnasium, 3 miles Northwest of Centralia IL, starting at 8 AM. Set-up is at 6 AM. Free parking. Reserve your tables in advance @ $1/foot. Bring your own tables @ $.50 per foot. Tailgating free. Admission/Main Prize tickets are $2 each or 3/$5, purchased in advance or at the Hamfest. For table and space reservations, contact ***Bud King WA9U, (618) 532-6606***. Mail ticket orders with an SASE to ***Centralia Wireless Assn., Inc., Hamfest Tickets, P.O. Box 1166, Centralia IL 62801***.

KALAMAZOO, MI The Southwest MI AR Team and the Kalamazoo ARC will co-sponsor a Hamfest at Kalamazoo Central High School. Take US 131 to M-43 east to Drake Rd., then north to the school. Doors open at 8 AM. Set-up at 6 AM. Advance tickets $2, $3 at the door. Free parking. No testing. Tables are $1.50/ft, 4 ft min. Send requests and payment with SASE before Oct. 7 to ***Gary Hazelton KB8PL, 75075 M-40, Lawton MI 49065***. Make checks payable to ***Kalamazoo Hamfest***.

MARION, OH The Marion ARC will present its 18th annual Heart of Ohio Hamfiesta/Computer Show at the Marion County Fairgrounds Coliseum from 8 AM-3 PM. Free parking. Advance tickets $4; $5 at the door. Tables $8. Talk-in on 147.90/.30 rptr. Contact ***Dan Burns N8JMF, 844 Robinson, Marion OH 43302. Tel. (614) 382-2384*** M-F after 4 PM, or S-S all day.

MILAN, OH The 1992 FARA Hamfest/Computer Fair will be sponsored by the Firelands ARA, indoors at the EHOVE Vocational School, just 1/4 mile north from Ohio turnpike Exit 7 (I-80/90) Rt. 250. Mobile Check-in is on 146.805/.205 MHz. Advance tickets $3, $4 at the gate. 8' tables $8 ea. Set-up Sat. 7 PM-10 PM; Sun. 6 AM. Gates open at 8 AM. Packet seminar/demonstration. ARRL Awards rep will be on hand to certify hams for DXCC. Ohio's largest factory outlet mall is across the street. A discount coupon book is provided for all ticket holders. Contact ***Gene Hutchins, 45 Welton Ave., Norwalk OH 44857. Tel. (419) 668-5796***.

QUEENS, NY The Hall of Science ARC Hamfest will be held at the New York Hall of Science parking lot, Flushing Meadow Park, 47-01 111th St. Vendor set-up at 7:30 AM. Buyers admitted at 9 AM. Free parking. Admission: Buyers $5, Sellers $8 per space. Talk-in on 445.175 NB2A rptr., 146.52 simplex. Call at night, ***Charles Becker WA2JUJ, (516) 694-3955; Arnie Schiffman WB2YXB, (718) 343-0172***.

TUCSON, AZ De Anza Drive-In, 22nd St. and Alvernon Way, will be the site of the 5th annual Tucson Hamfest, sponsored by the Old Pueblo Radio Club, ARRL and ARCA. Open from 7 AM-1 PM. There will be meetings for ARCA, Repeater Owners, and AZ Node Operators. Flea Market. Sellers $4 per space (includes FREE cup of coffee and FREE drawing ticket). Buyers $1. Talk-in on 146.22/.82, 146.28/.88, and 146.52 simplex. Contact ***A.J. Pawlowski KB7K2, 3418 W. Green Trees Dr., Tucson AZ 85741. Tel. (602) 742-2605***.

OCT 24

GRANDVIEW, MO The annual Octoberfest, sponsored by the Southside ARC, will be held at Grandview East Junior High School, 12650 Manchester, from 8 AM-3 PM. Free parking. Wheelchair accessible. Advance tickets 4/$5; 3/$5 or $3 each at the door. Table space $12 per table, limit 3 per exhibitor. Set-up at 6:30 AM. Talk-in on 147.12+. A transmitter hunt will follow the hamfest. Contact ***Southside ARC, P.O. Box 1142, Grandview MO 64030***, or ***Frank Staudenraus N0GXO, (816) 331-7338***.

GREENWOOD, N.S., CANADA The Greenwood ARC will hold its 4th annual Ham/Electronics Flea Market from 9 AM-2 PM at the Greenwood Community Center in Greenwood, Nova Scotia. Talk-in on 147.240+ VE1WN rptr. Contact ***Jim Baskey VE1APV, Greenwood ARC, P.O. Box 63, Greenwood NS B0P 1N0, Canada. Tel. (902) 765-6272***, or ***FAX (902) 765-5449***.

SUMTER, SC The Sumter ARC will hold their 6th annual Hamfest at the Sumter Exhibition Center, 700 W. Liberty St., from 8 AM-4 PM. VE Exams. CW Contest. Friday night Cookout. Admission $5. Tables $6. Talk-in on 147.015. Contact ***Dan Mask WB5SGH, (803) 775-9106***, or write to ***P.O. Box 193, Sumter SC 29151***.

OCT 24-25

CHATTANOOGA, TN Hamfest Chattanooga will hold their Amateur Radio & Computer Convention at the Chattanooga-Hamilton County Convention & Trade Center. For more info, contact ***Barbarra Gregory WA4RMC, P.O. Box 3377, Chattanooga TN 37404. Tel. (615) 892-8889***.

OCT 25

DUBLIN, PA The R.F. Hill ARC will hold their annual Hamfest at the Dublin Firehouse, Rte 313, .5 miles from Doylestown. VE Exams, all classes; bring documents. Flea Market spaces: indoors $8; outdoors $6. Bring your own tables. Admission $5. Hamfest Hotline: ***Bob Frantz, (215) 536-9098*** or ***P.O. Box 29, Colmar PA 18915***.

MILFORD, CT The Coastline Amateur ARA will conduct VE Exams for all classes at the Fowler Bldg., 145 Bridgeport Ave., starting at 12 noon. Walk-ins. Contact ***Gary NB1M, (203) 933-5125*** or ***Dick WA1YQE, (203) 874-1014***.

Continued on page 26

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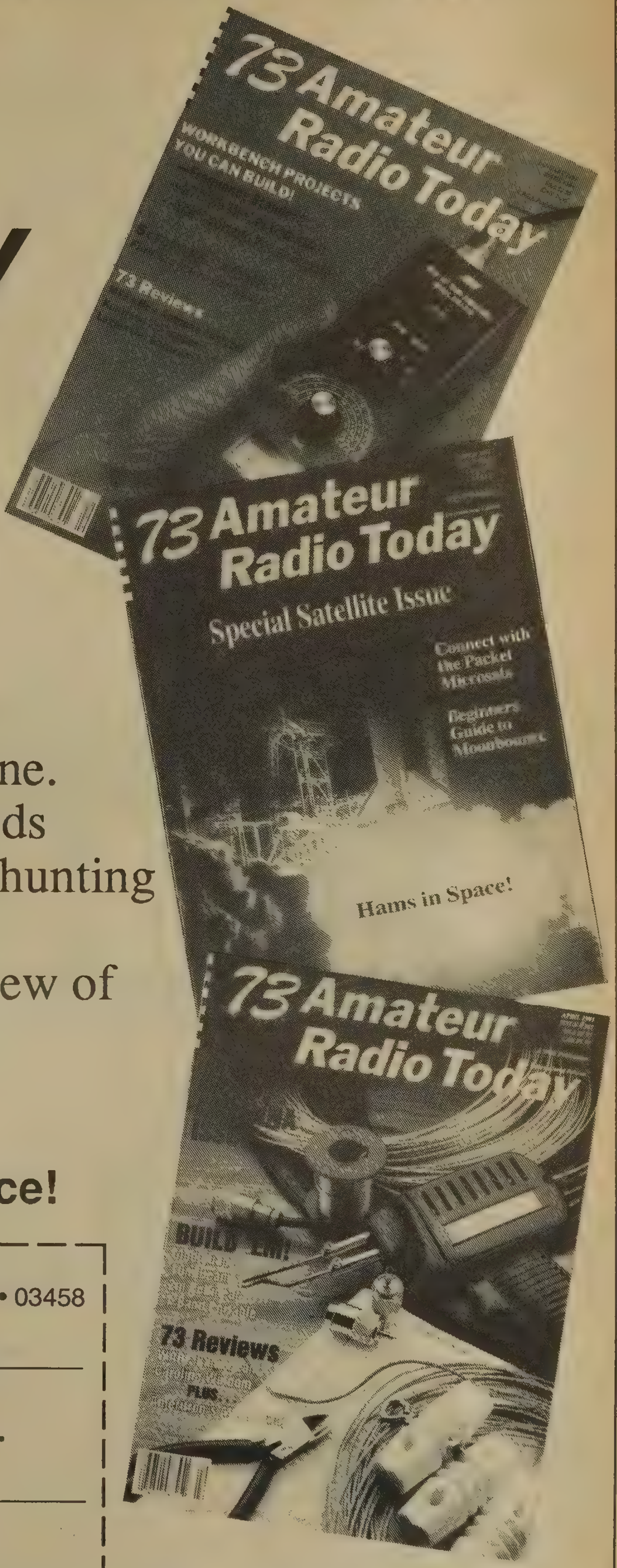

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Continued from page 24

OCT 31

FRANKLIN, KY FranklinFest '92 will be sponsored by the Southern Kentucky AR Group, on Wall St., from 8 AM-2 PM. Directions: from the North—exit 6 off of I-65, Weston KY 100, turn left onto KY 1008 to Wall St. Event is on the right side of the intersection. From the South—Exit 2 off of I-65, north on US 31W, right on 1008, left on Wall St., we're on the right. Nashville is only 40 minutes away. Admission $5 in advance. Tables $4. Free parking for cars, RVs and busses. Talk-in on 146.065/.665 and 146.52. Contact ***Ed Schwab KA4REF, P.O. Box 9656, Bowling Green KY 42102. Tel. (502) 843-4389***.

GROTON, CT The annual Tri-City ARC Auction will be held at the Senior Citizens Center, Waterford Municipal Complex (Rt. 85, south of Exit 77 of I-395, or north of Exit 82 of I-95). Set-up at 9 AM. Auction from 10 AM until sold out. Free admission. Wheel chair access. Bring your equipment to be auctioned. Talk-in on 146.07/.67 rptr. For info call ***KA1BB, (203) 739-8016***.

ST. LOUIS, MO The Gateway Ham Radio Club will sponsor a Hamfest at the West County Technical School from 8:30 AM-2 PM. Set-up at 6:30 AM. Exit south from I64/US40 on Maryville Center Drive. VE Exams: call *(314) 567-8777* to register. Flea Market. Admission tickets $1 in advance, $2 at the door. Indoor tables $5. Tailgating $3. Talk-in on 146.94/4. Contact ***Angie Fischer KB0HXY, (314) 225-5560***, or ***Dave Novak N0DN, 10 Ann Ave., Valley Park MO 63088. Tel. (314) 225-1952***, answering machine.

ST. PAUL, MN The 8th annual Hamfest Minnesota & Computer Expo will be held at the St. Paul Civic Center. Presented by the Twin Cities FM Club, "The Big One' will feature major manufacturers, a huge indoor Flea Market, VE Exams, etc. Advance tickets $5, $6 at the door. Tables $18 ea. Special educational seminar by Carole Perry WB2MPG. Talk-in on 146.16/.76 rptr. For info, write ***Hamfest Minnesota & Computer Expo!, P.O. Box 5598, Hopkins MN 55343***, or call the ***Minnesota Hotline, (612) 535-0637***.

NOV 8

LONG ISLAND, NY HAMEXPO, sponsored by the Radio Central ARC, will be held from 9 AM-4PM at Suffolk Community College, Long Island Expwy exit 62—Nicholls Rd./County Rd. 97 North 1 mile. Free parking. All indoor Flea Market, ham dealers, computer show, VE Exams, DX. Admission $5 at the door. Tables $20 in advance. Send to ***Radio Central ARC, P.O. Box 680, Miller Place NY 11764***. Talk-in on 145.15-4Z or 449.525-2A. Contact ***John Mark KB2QQ, (516) 689-6336*** or ***Jo Ann Colletti N2IME, (516) 399-1877***.

SPECIAL EVENT STATIONS

OCTOBER 1992

BAHAMAS The Bahamas ARS will operate C6A500 throughout the month of October, to commemorate the 500th anniversary of the discovery of the New World by Christopher Columbus. Operation will be continuous during 0001Z-2359Z Oct. 12, otherwise, intermittent coverage will be kept through the month. Frequencies: 3590, 3740, 7030, 7090, 7290, 14,070, 14,135, 14,290, 18,150, 21,140, 21,204, 21,390, 24,950, 28,190, 28,350, 28,990, 146.640 -600. All authorized BARS members may operate in Oct. with /500 suffix. Awards: 1. Three different /500 contacts; 2. Ten different /500 contacts (one must be C6A500). For QSL send SAE and 3 IRCs to ***BARS, Box SS.6004, Nassau, Bahamas, or Bahamas Bureau***. For an award, send a copy of your log with 3 IRCs.

OCT 1

HOUSTON, TX The M.D. Anderson Hospital AR Volunteers, sponsored by the University of Texas M.D. Anderson Cancer Center, will operate Station KK5W, 1500Z-2100Z, to commemorate the 9th annual Childrens' Christmas Card Parade through the Medical Center. During 1630Z-1830Z, operation will be from a float in the parade. Frequencies: 7,292.9, 18,129.9, 21,392.9, 28,392.9. For a certificate, send QSL and a 9 x 12 SASE to ***KK5W, M.D. Anderson Hospital, Amateur Radio Volunteers, 1515 Holcombe Blvd., Houston TX 77030-4095***.

OCT 3-4

PITTSBURGH, PA The Breezeshooters ARC will operate W3XX from the USS Requin SS481, a WWII submarine. Time: 1400Z-2100Z each day. Phone frequencies: 28.450, 21.350, 14.250, 7.250, 146.52. CW frequencies: 28.150, 21.050, 14.050, 7.050. This SE Station is being operated to celebrate the 1st year anniversary of the Carnegie Science Center. For a QSL card and certificate, send an 8 1/2 x 11 SASE to ***Ron Berry WB3LHD, 326 Sunset Dr., Bethel Park PA 15102***.

OCT 10-11

COLOMBUS, IL The Western Illinois ARC will operate Station W9AWE in celebration of the Quincentennary of the European Discovery of America. Time: 1400Z Oct. 10-2400Z Oct. 11. General SSB and CW sub-bands, packet, and 147.03 W9AWE rptr. For certificate, send QSL and SASE to ***WIARC, P.O. Box 3132, Quincy IL 62305***.

NEWCASTLE, IN The Henry County ARC will operate Station KA9RWP in conjunction with the "Raintree Jamboree,' beginning at 10 AM both days, on the General portion of 80m, 40m, 20m, and 21.385/28.385. Contact ***KA9RWP, P.O. Box 607, New Castle IN 47362***.

TULSA, OK Tulsa ARC, under the call sign W5OK, will be the official SE Station for the "Year of the Indian 1992' being celebrated throughout the State of Oklahoma. The Office of State Tourism has recognized the TARC for this celebration. The event will begin at 1700Z Oct. 10 and will end 1700Z Oct. 11. Phone—lower 25 kHz of the General 15, 20, 40, and 80 meter sub-bands and the Novice 10 meter sub-band. There will also be a 2 meter SSB station. CW—lower 25 kHz or the General 20, 40 and 80 meter sub-bands and the Novice 15 meter sub-band. For a unique certificate, send QSL and a 9 x 12 SASE to ***Tulsa Amateur Radio club, P.O. Box 4283, Tulsa OK 74159***.

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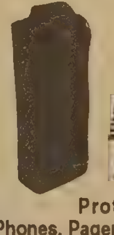

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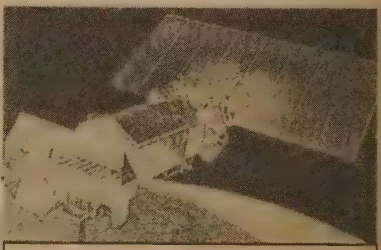

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OCT 11-12

COLUMBUS, OH The Columbus ARA will operate W8TO 11 AM-10 PM EST (1600-0300Z) Sat., and 11 AM-8 PM EST (1600-0100Z) Sun., to commemorate Columbus Day and the 500th anniversary of the discovery of the Americas. The station will operate portable from the Columbus Day Celebration Site, Riverfront Dr., downtown Columbus, in the General and Advanced portions of 10, 15, 20, 40, and 80 meters, beginning with the 10m band and moving to the next band every two hours each day. Contact with W8TO counts 6 points per band per day. Contacts with any other central Ohio station (0500Z Fri.-0500Z Sun.) on any HF band counts 1 point per station per day. For a commemorative certificate, send a copy of the log sheet(s) which show contacts worth at least 10 points, and a 9 x 12 SASE, to *Thomas Camm, 1634 Dundee Ct., Columbus OH 43227-2421*.

OCT 15-18

CINCINNATI, OH U.S.A. area radio amateurs will participate in the 1992 Tall Stacks Celebration of America's river steamboating era, throughout the month of Oct. On-air operation is sponsored by the Greater Cincinnati ARA and the OH-KY-IN ARS. QSL cards will feature the 17 historic steam paddle riverboats that will assemble on the Ohio River at the Port of Cincinnati from 15-18 Oct. QSLs will be available from Tall Stacks stations, for contacts throughout Oct. Participating stations will use the call sign suffixes "Tall Stacks" or "/TS." OH-KY-IN station K8SCH will be particularly active Oct. 15-18. Tall Stacks, sponsored by the Greater Cincinnati Convention and Visitors Bureau, recalls the historic and continuing importance of river commerce to middle America.

OCT 16-17

GILMER, TX East Texas area amateurs will operate KI5UA to celebrate the 55th annual East Texas Yamboree. Operation will be in the General 40, 20 and 15 meter phone sub-bands; the Novice 10 meter phone sub-band, and locally on the 147.32 rptr. For a certificate, send your QSL and 8 x 12 SASE to *KI5UA, Rt. 2, Box 113, Diana TX 75640*.

OCT 20-21

WESTMONT, IL The Westmont ARC will sponsor a School-to-School QSO Party from 0800Z Oct. 20-0800Z Oct. 21. This event allows students of all cultures to meet one another via Ham Radio. If you want to participate, please drop a packet via *S-KA9GQF @ W9QVE No. II. "School to School."* Send all reports to *Westmont ARC, P.O. Box 8, Westmont IL 60559, USA*.

OCT 21-23

NEW YORK, NY The "22 Crew" will operate WB2JKJ from the headquarters of the Radio club of Junior High School 22 to celebrate the 12th anniversary of the Club, and EDUCOM, Education thru Communication. Join them on 7.238 MHz from 1200-1330 UTC, then on to 21.395 till 2000 UTC. For an outrageous QSL and surprise package, write to *RC of JHS 22, P.O. Box 1052, New York NY 10002*, or FAX it to *(516) 674-9600*.

OCT 23-25

UNION, KY The Northern Kentucky ARC will operate K4CO 1400-2100Z from Big Bone Lick State Park, in conjunction with the annual Salt Festival and The Commonwealth of Kentucky's Bicentennial Celebration. Operation will be on 40, 20, 10 meter phone, and 147.375+ rptr. For a certificate, send a 4 x 9 SASE and contact number to *NKARC, P.O. Box 1062, Covington KY 41012-1062*.

OCT 24-25

BROWNSVILLE, TX The South Texas ARA (STARS) will operate N5CAF Oct. 24-25 from 1500Z-2200Z to commemorate the Border Air Fiesta II, sponsored by the Confederate Air Force's Rio Grande Valley Wing. Voice operation on HF will be on 21330 MHz or 28425 MHz, depending on band conditions. Contacts via a UHF remote link will be attempted with CAF pilots in flying aircraft. Listen for the CAF B-17, B-25, P-51, C-47, etc. For a photo QSL, send your SASE and QSL to *Dr. David Woolweaver K5RAV, 2210 S. 77 Sunshine Strip, Harlingen TX 78550*.

COOKEVILLE, TN The ARS of Tennessee Technological University (WA4UCE) will operate an SE Station in conjunction with the Tennessee Technological University 47th Homecoming celebration. Operations will be on the General portions of the 80, 40, 20, 15 and 10 meter bands, and the Novice portion on 10 meters. For a certificate, send QSL and a 9 x 12 SASE to *TTARS, Tennessee Technological University, Box 5262, Cookeville TN 38505*.

OCT 31

ST. PAUL, MN Station WØAA will be operated from the St. Paul Civic Center, by the S.M.A.R.T.S. RC, in conjunction with the Hamfest Minnesota & Computer Expo. W0AA will operate on the lower 25 kHz of the 20 and 40 meter band and on the Novice and Tech portion of the 10 meter band. Time: 7:30 AM-3 PM CST. For QSL, send SASE to *WØAA-Hamfest Minnesota & Computer Expo, P.O. Box 5598, Hopkins MN 55343*.

OCT 31-NOV 1

BREVARD, NC The Transylvania County ARC will operate K4AIF to celebrate Halloween from the Devil's Courthouse in Transylvania County. Operating hours will be from 2100Z Oct. 31-0200Z Nov. 1. Frequencies: 3.860, 7.243, 14.295, 21.365, 28.335, 144.25, all SSB and 146.52 (FM simplex). For a certificate, send a legal size or 9 x 12 SASE to *K4AIF, Dick Gustafson, 302 Wilson Dr., Brevard NC 28712*.

Don't Miss an Issue!

See Aug. 73, page 72 for details.

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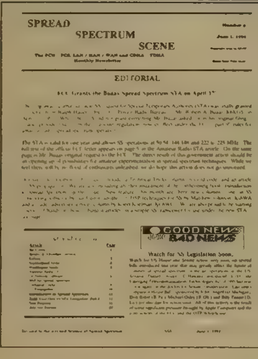
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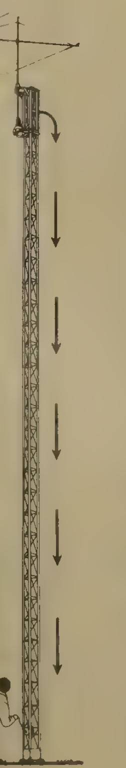

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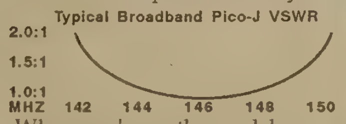

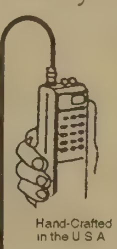
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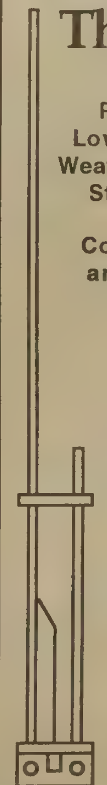

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Radio Fun flea market

Turn your old ham and computer gear into cash now. Sure, you can wait for a hamfest to try and dump it, but you know you'll get a far more realistic price if you have it out where 100,000 active ham potential buyers can see it, rather than the few hundred local hams who come by a flea market table. Check your attic, garage, cellar, and closet shelves and get cash for your ham and computer gear before it's too old to sell. You know you're not going to use it again, so why leave it for your widow to throw out? That stuff isn't getting any younger!

The *Radio Fun Flea Market* costs you peanuts (almost)-comes to 10 cents a word for individual (noncommercial) ads, and 70 cents a word for commercial ads. Don't plan on telling a long story. Use abbreviations, cram it in. But be honest. There are plenty of hams who love to fix things, so if it doesn't work, say so.

Make your list, count the words, including your call, address and phone number. Include a check or your credit card number and expiration. If you're placing a commercial ad, include an additional phone number, separate from your ad.

This is a monthly magazine, not a daily newspaper, so figure a couple of months before the action starts; then be prepared. If you get too many calls, you priced it too low. If you don't get many calls, too high.

So get busy. Blow the dust off, check everything out, make sure it still works right, and maybe you can help make a ham newcomer or retired old-timer happy with that rig you're not using.

Send your ads and payment to *Radio Fun Flea Market*, Judy Walker, 70 Route 202N, Peterborough, NH 03458.

SELL: Heath HWA-230 DTMF keypad for HWS-2 and HWS-4 HT's. New, unused, $22. KB5AYO, Glenn, RT. 1, Box 580-B, Reserve LA 70084. RF248

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new products

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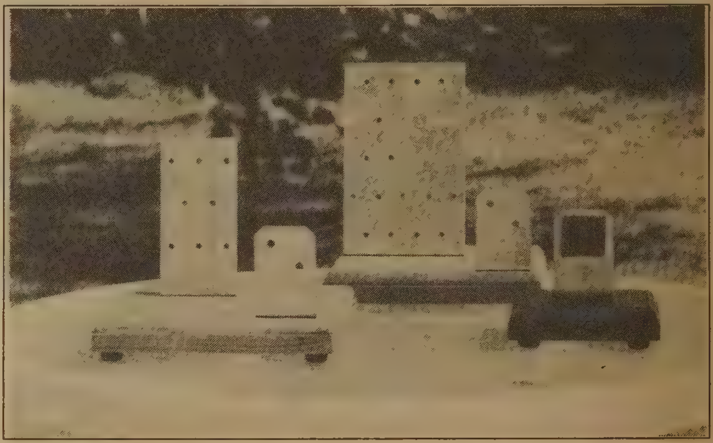
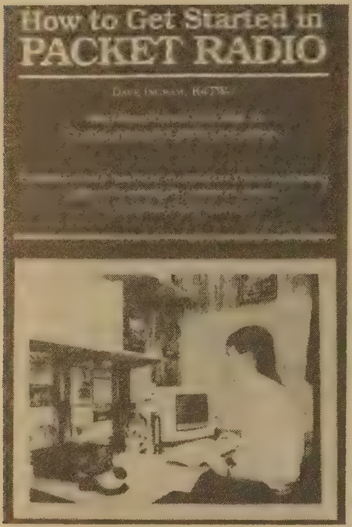
Personal Code Explorer is $129 plus $4 shipping and handling. For more information, contact *Microcraft Corporation, P.O. Box 513, Thiensville WI 53092; (414) 241-8144.* Or circle Reader Service No. 202.



NATIONAL AMATEUR RADIO ASSOCIATION



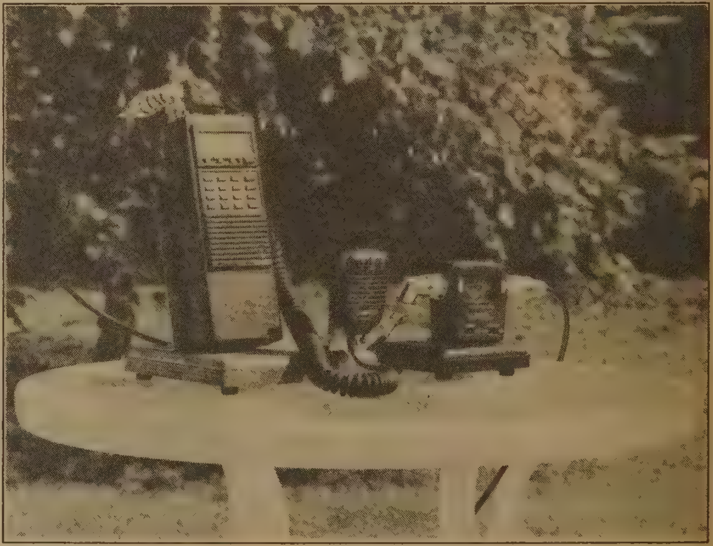
The National Amateur Radio Association has just released another book in its "how to" series, called *How to Get Started in Packet Radio*. Packet is one of the most exciting and rapidly expanding areas of ham radio, yet most available information is written for those skilled in both computers and communications. This book, written for those with little knowledge of computers or radio communications, was created by Dave Ingram K4TWJ. He opens the book with a non-technical description of packet radio, and explains digipeating with a comparison to passing notes in school, an analogy that is both technically correct and easy for newcomers to visualize. Other chapters describe commercial equipment available to the packeteer, setting up a station, networks, BBSs, and portable and high frequency operation. The book concludes with an appendix with schematics for interfacing most popular TNCs and VHF-FM radios. The progression takes the beginner from selecting equipment to making connections and interfacing and concludes with actual operation.

How to Get Started in Packet Radio is priced at $9.95 and is available from most amateur radio dealers or directly from NARA. Contact *Elizabeth Tackett, National Amateur Radio Association, P.O. Box 598, Redmond WA 98073-0598; 1-800-GOT-2-HAM.* Or circle Reader Service No. 203.

TOWNSEND ELECTRONICS

Townsend Electronics has announced some new additions to their line of C.M. Howes kits from England. New in the line is an add-on digital readout kit for all analog receivers and transceivers.The DR 4 kit features a heavy-duty aluminum case with an anodized aluminum face, in black, with silver lettering. The outer case can be painted to match your present gear. Included with it is a programmable matrix which can switch to any preset IF so that you can use this on many types of receivers or transceivers by just throwing a switch. One advantage to these kits is that they are modular—you can buy the case kit and then add the components as you can afford them, or use some of your own with those available from Townsend.

To receive a catalog (which also includes their radio mounts and numerous books and magazines from England), send $1 for first class mail to *Townsend Electronics, Inc., P.O. Box 415s, Pierceton IN 46562; (219) 594-3661, Fax: (219) 594-5580.* Or circle Reader Service No. 204.



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The Handie-Base is a stand for your handie talkie or hand-held scanner which offers a steady, secure place for operating at your desk, coffee table, dining table or any other flat surface. The Handie-Base is constructed of wood and metal, with rubber feet to prevent sliding. If your hand-held radio has a belt clip, this device will provide a steady secure site for using it as a portable, or you can attach coax from an external antenna, along with a power supply and an extension speaker mike, thus creating a base station from your hand-held radio. No more dragging cords around to get the maximum output from your talkie or scanner. It also allows for using your handie talkie as your packet transceiver without hunting to find a place for your radio. These stands will last for years and they carry a five-year repair or replacement warranty.

The stands are $14.95 plus $3.50 shipping and handling (check or money order). Other models are available for hand-held scanners, tall battery handhelds, and small SWR/power meters. Contact *Handie-Base & More, P.O. Box 2504, Broken Arrow OK 74013-2504; (918) 357-2139.*. Or circle Reader Service No. 201.

Uncle Wayne's Bookshelf

BOOKS FOR BEGINNERS

20N018 **Technician Class License Manual: New No-Code** ***by Gordon West*** This book will cover everything you need to become a Technician Class Ham. Every exact question and answer on the examinations is found in this one book covering element 2 and element 3A question pools. Gordon West tells you the right answer and then explains in detail why the answer is correct. Fully illustrated text, frequency chart showing privileges, list of examiners and an FCC Form 610 application. **$9.95**

20N092 **The Wonderful World of Ham Radio** ***by Richard Skolnik, KB4LCS*** This book addresses the plea that something simple, clear, and fun be written to introduce young people to amateur radio. Pick up one for the new ham in your life. **$7.95**

20N099 **Digital Electronics Projects for Beginners** ***by Owen Bishop*** contains 12 digital electronics projects suitable for the beginner to build with the minimum of equipment. 128 pp., 56 line drawings **$12.50**

20N100 **Electronics Build and Learn (2nd edition)** ***by RA Penfold*** combines theory and practice so that you can `learn by doing.' Full construction details of a circuit demonstrator unit that is used in subsequent chapters to introduce common electronic components. Describes how these components are built up into useful circuits, oscillators, multivibrators, bistables, and logic circuits. 128 pp., 18 photos, 72 line drawings. **$12.50**

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AR3292 **Your Introduction to Morse Code: Practice Cassettes** companion code course to *Now You're Talking!*, this kit includes two 90 minute cassette tapes. Prepares you for the 5 WPM Morse code exam to earn your Novice license or add high-frequency worldwide communications privileges to your code-free Technician license. **$10.00**

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09S42 **The Scanner Listener's Handbook** ***by Edward Soomre N2BFF*** Get the most out of your scanner radio. Covers getting started, scanners and receivers, antennas, coaxial cable, accessories, computer controlled monitoring, more. **$14.95**

03S208 **Radioteletype Press Broadcasts** ***by Michael Schaay*** Covers schedules of Press Services by time, frequency, and country broadcasting in English, French, German, Spanish, and Portuguese. Detailed Press Agency Portraits. 120pp. **$12.95**

03K205 **Guide to Radioteletype (RTTY) Stations** ***by J. Klingenfuss*** Updated book covers all RTTY stations from 3MHz-30MHz. Press, Military, Commercial, Meteo, PTTs, embassies, and more. 105 pp. **$12.95**

11RF13 **The "Top Secret" Registry of US Government Radio Frequencies (7th Ed.)** ***by Tom Kneitel K2AES*** This scanner directory has become the standard reference source for frequency and other important information relating to the communications of federal agencies. 25 to 470 MHz. **$19.95**

11F52 **Ferrell's Confidential Frequency List** ***compiled by A.G. Halligey*** All frequencies from 4MHz—28MHz covering ship, embassy, areo, Volmet, Interpol, numbers, Air Force One/Two, more 376 pp. **$19.50**

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05A95 Easy-up Antennas for Radio Listeners and Hams ***by Edward M. Noll*** Like to learn how to construct low-cost, easy-to-erect antennas? Easy-up Antennas will help you. **$16.50**

10A345 **Beam Antenna Handbook** ***by William Orr W6SAI/Stuart Cowan W2LX*** Yagi beam theory, construction, operation. Wire beams, SWR curves. Matching systems. A ``must" for serious DXers. **$11.95**

10A343 **All About Cubical Quad Antennas** ***by William Orr W6SAI/Stuart Cowan W2LX*** The ``Classic" on Quad design, theory, construction, operation. New feed and matching systems. New data. **$9.50**

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01A70 **Practical Antenna Handbook** ***by Joseph J. Carr*** Design, build, modify, and install your own antennas. Carr, a 20-year veteran of technical writing, has a unique ability to present complex technical concepts in an easy-to-understand way. 416 pp. **$21.50**

UHF/VHF/PACKET

10A347 **All About VHF Amateur Radio** ***by William Orr W6SAI*** DX propagation, VHF yagi and quad beams, repeaters and how they work, OSCAR satellites and how to use them. **$11.95**

03R02 **RTTY Today** ***by Dave Ingram K4TWJ*** Only up-to-date RTTY book in existence. Covers all facets of RTTY. Most comprehensive RTTY guide ever published. Fully illustrated. 112 pages. **$8.50**

01P22 **The Packet Radio Handbook** ***by Jonathan L. Mayo KR3T*** ``...an excellent piece of work. Well worth reading for both the experienced and the new packeteer...the definitive guide to amateur packet operation."—Gwyn Reedy W1BEL **Only $15.00**

20N019 **U.S. Repeater Mapbook** ***by William Smith,N6MQS*** The guide for traveling radio amateurs gives you repeater frequencies, and locations on easy to read state map. Includes all 50 states and 28–1200MHz. **$9.95**

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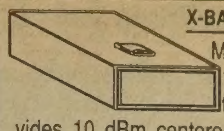

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Continued from page 13

clients. However, a few of these companies will often accomodate small orders. To locate really hard-to-find parts, it is sometimes necessary to contact the manufacturer (or importer) directly and ask for the name of the distributor. You may actually be able to obtain a free part directly from the manufacturer or their marketing representative (usually if it's a brand-new device and they are just starting to introduce it into the market).

Catalog Collecting

Most mail order companies will send you their catalog free for the asking. Once you are on their mailing list, you will probably get their new catalog every time they update it. Start a collection of catalogs and have fun browsing—you'll be surprised at some of the bargains you'll find. I check out ads in the electronics magazines I receive and call or write any mail order or surplus houses to obtain their catalog. I circle the reader service cards for the mail order houses or specialty component companies as well. Pretty soon you'll have a collection of catalogs that'll offer just about any components you could possibly desire.

I have listed a number of the mail order companies that I use a lot. This is by no means a complete list of all that are out there, but I've had very good results from the ones on this list and their minimum order is generally fairly low ($30 or less).

Have a great time perusing your catalogs and happy hunting. RF

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letters

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have any equipment or a license I was treated like a leper. I kindly asked for my membership fee back and after they grudgingly gave it to me I started hanging around with an enthusiastic, technically-oriented group. We get together with our receivers and scanners and just listen! We develop and discuss improvements in our receivers and antennas (we are computer nuts too!). We also drill each other because we all want that *privilege* to transmit some day and with this group, we all will be licensed members of the best hobby around. The other club dissolved due to lack of members, I bet they still can't understand why.

Kelly B. Anderson KD7OD, R/O Steam Tanker Charleston KNJF, Wilmington DE As a radio officer in the U.S. Merchant Marine, I understand the importance of reliable communications. Courtesy, professionalism and tolerance have always been tantamount to these ends. Radio has had a long tradition of inter-assistance, regardless of race, creed, nationality or personal beliefs of the individual operator. Sadly, I see part of this tradition unraveling on parts of the ham bands. While most of us feel that we are contributing something to the radio art, there are those whose only satisfaction seems to come from lobbing canisters of "electromagnetic holier than thou hate mail" at one another. My first reaction to hearing this crap is to brush it off as rivalry between those with feeble minds, but these tantrums can be heard almost constantly on parts of the bands and must be an eye-opener for newcomers and prospective hams. In all, it is an open wound in the hobby. These problem operators are a small fraction of a percentage of the ham community, yet they occupy a disproportionate amount of the RF spectrum with their nonsense.

For many of us, ham radio has been a springboard to successful careers in many fields. As for myself, I am 30 years old and have been licensed for 16 years. Besides my work as a shipboard radio officer, I have built a successful shore-side electronic business and have been heavily involved in the formation and growth of amateur emergency communications in my area. These things and many non-radio pursuits keep me busy. I am proud to associate with many successful and interesting people who are also ham radio operators. I am convinced that the time-honored traditions of tolerance, integrity, and goodwill will continue to dominate our bands. Most of us in the ham community have found much pleasure in the hobby. While we have made our individual contributions to it and have drawn elements from it to improve our lives personally, these losers are wasting a good portion of their best years idly attacking their fellow amateurs with jamming, name calling, and on-the-air accusations. I have just one thing to say to those few lids who find pleasure using their license as a soapbox to be obnoxious and mean-spirited: Get out of the operating chair for a while, move out of your mother's basement, and GET A LIFE! RF

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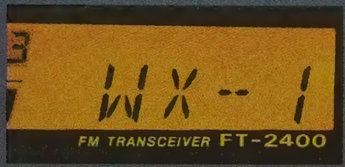

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